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Techno-economic performance of marine capture fisheries

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PREPARATION OF DOCUMENT

This document has been prepared by Dr. U. Tietze and Mr. Joel Prado, Fishery Industry Officers of the Fishery Industry Division, FAO Rome and by Mr. Jean-Michel Le Ry, Consultant, Managing Director, Sobretah, Riantec, France and R. Lasch, Head (rtd.), Institute of Agricultural Market Research, Federal Agricultural Research Centre, Braunschweig, Germany. It summarises the findings of national studies carried out in Peru, Argentina, Trinidad and Tobago, Barbados, Antigua and Barbuda, Spain, France, Norway, Germany, India, Thailand, Indonesia, the Republic of Korea and the Peoples Republic of China. during 1999 and 2000 and gives an account of the proceedings and recommendations of an interregional workshop held in Lucknow, India, from 2 - 6 April 2001 and hosted by the National Bank for Agriculture and Rural Development.

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ABSTRACT

The Fisheries Technical Paper summarises the findings of 15 country level studies on the economic and financial performance of marine capture fisheries conducted in 1999 and 2000. The studies validate the findings of surveys carried out between 1995 and 1997 and published in FAO Fisheries Technical Paper No. 377. Out of the 108 types of fishing vessels studied in 15 South American/Caribbean, European, African and Asian countries, 105 or 97 % had a positive gross cash flow and fully recovered their cost of operation. Only three types of vessels i.e. stow-netters in China and semi- industrial and industrial shrimp and bottom fish trawlers in Trinidad and Tobago showed operational losses. When also considering the cost of capital i.e. the cost of depreciation and interest, 92 out of the 108 types of vessels or 85 % showed a net profit after deducting the cost of depreciation and interest. In the 10 countries, which participated in the previous as well as in the recent study, two countries showed marked improvements in the profitability of their fishing vessels i.e. France and Spain while two countries showed a declining profitability i.e. the Peoples Republic of China and Germany. In the remaining six countries i.e. the Republic of Korea, Indonesia, India, Senegal, Argentina and Peru, the situation was similar as during the previous study carried out between 1995 and 1997. These overall positive results were also achieved because of higher prices paid to producers as compared to the previous study period. There were only few indications that fishing effort had been reduced and fish stocks had recovered. It was also observed that some fishing fleets had adapted themselves to new conditions dictated by depleted and changing abundance of resources and new access to markets in the context of globalisation by changing their fishing operations. Those vessels that had previously shown positive results but now incurred losses were generally older vessels, which continued to work on overexploited stocks.

Regarding the impact of Government financial transfers it was found that in two countries, belonging to the European Union and in India, almost all types of vessels covered by the cost and earnings study, which received subsidies, would also have been profitable without subsidies. In the Republic of Korea, the situation was mixed while in Thailand, those types of vessels. which could avail themselves of tax exemptions on fuel needed the tax exemption in order to have a positive gross cash flow. No subsidies were available in Indonesia. In the case of other countries it was observed that no detailed empirical information was available neither on the amount of Government financial transfers to the fishing industry nor on the financial performance of individual fishing enterprises. There is a need to collect and analyse information on the quantity and impact of Government financial transfers on the economic performance of fishery enterprises with a view to reduce and rationalise the use of scarce Government financial resources and to avoid that subsidies have a negative impact on fisheries resources. on the coastal environment and on trade.

With a view to identify economically more efficient ways of utilisation of catches and to provide guidance, particularly to fishery industries of developing countries, it is suggested that further monitoring and analysis should focus on utilisation of catch and marketing of fishery products.

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Chapter 1

Introduction and background

The Fisheries Technical Paper summarises the findings of 15 country level studies on the economic and financial performance of marine capture fisheries conducted in 1999 and 2000. The studies form part of the monitoring of the economic viability of marine capture fisheries by the Fisheries Department of FAO, which is carried out in close co-operation with fisheries research institutions and national fisheries administrations in selected countries in Asia, Africa, Latin America and Europe. The paper also summarises the proceedings of an inter-regional workshop held from 2 - 6 April 2001 at the Bankers Institute of Rural Development in Lucknow, India, where the findings of the studies were presented and discussed. The programme of the workshop, a list of participants and a summary of the workshop proceedings can be found in ANNEX II, III and IV, respectively.

The country level studies presented and analysed in this paper update and validate earlier surveys carried out between 1995 and 1997 in 13 selected countries in Latin America, Europe, Africa and Asia. In 1995, these countries accounted for 49% of the marine capture fisheries production in their respective regions and for 41% of the global marine production. A comparative analysis of the findings of the studies and of the proceedings and recommendations of an inter-regional workshop where the findings were discussed were published as FAO Fisheries Technical Paper 377.[1] The findings of this first round of studies were also featured in the FAO Report on the Status of World Fisheries and Aquaculture 2000[2] as well as in INFOFISH International[3] and INTERCOAST.[4]

The general conclusion of the previous studies was that, in most cases, marine capture fisheries is an economically and financially viable undertaking, which generates sufficient funds for reinvestment in addition to generating income, employment and foreign exchange earnings. It was also found that the generally positive economic performance of marine capture fisheries was being achieved in an environment where fisheries resources were fully exploited and overexploited and the question was raised how long this could last.

It was concluded that there is an urgent need to strengthen and put in place efficient measures to limit fishing effort and rehabilitate coastal areas and aquatic resources. For future monitoring of the economic performance of marine capture fisheries, the impact of fisheries management measures on the economic performance of fishery industries and related changes of fishing fleets and their operations including the use of responsible and selective fishing practices were identified as priority area. Other important areas for future monitoring were identified as the impact of subsidies, economic incentives and fiscal policies and measures on the profitability and sustainability of fishing operations[5] and role of fish utilisation and marketing in the economic performance of fishing enterprises.

Following above recommendations, the monitoring of the economic performance of marine capture fisheries was continued and additional fisheries and countries were included i.e. Norway, an important Nordic fishing nation, the Caribbean islands of Antigua and Barbuda, Barbados and Trinidad and Tobago and Thailand.[6] Information collected between 1995 and 1997 on Spain, France, Germany, the People's Republic of China, the Republic of Korea, Indonesia, India, Senegal, Argentina and Peru has been updated so that altogether 15 countries were covered by the study. Of the countries, which had participated in the first round of studies three were not included in the recent studies i.e. Ghana, Malaysia and Taiwan, Province of China. The recent studies followed the same methodology as the ones described in FAO Fisheries Technical Paper 377.

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[1] Economic viability of marine capture fisheries. Findings of a global study and an interregional workshop. FAO.Fisheries Technical Paper. FAO Rome 1999.

[2] The state of world fisheries and aquaculture. FAO Rome 2000, pp 91-98.

[3] U.Tietze/J.Prado: Economic and financial efficiency of tuna fisheries, in: INFOFISH International 1/2001, pp 65-68.

[4] U. Tietze: Economic viability of marine capture fisheries, in: INTERCOAST, International Newsletter of Coastal Management, Coastal Resources Center, Universitry of Rhode Island, USA, 2000.

[5] See also: Report of the expert consultation on economic incentives and responsible fisheries. FAO 2001.

[6] While Thailand was represented in the previous inter-regional workshop, it was not included in the first round of country level studies.

The findings of the recently conducted studies and their comparative analysis were presented and discussed in a workshop, which was hosted by the National Bank for Agriculture and Rural Development (NABARD) of India and organised by the Fishery Industries Division of FAO in co-operation with the Asia and Pacific Rural and Agricultural Credit Association (APRACA). The workshop was held from 2 - 6 April 2001 at the Bankers Institute of Rural Development in Lucknow.

The workshop had five major outcomes:

- Up-dating of information on the economic viability/efficiency of marine capture fisheries and identification of new trends.
- Generation of information on the impact of cost reducing and revenue enhancing transfers/subsidies on the economic performance of fishing fleets
- Generation of information on changes of fishing fleets and their operations in the countries studied.
- Discussion of the role of value addition/fish utilisation with regard to the economic performance of marine captures fisheries.
- Guidance for future monitoring of marine capture fisheries.

Chapter 2

Summary of findings

2.1 RECENT TRENDS AND CHANGES IN FINANCIAL AND ECONOMIC PERFORMANCE OF MARINE CAPTURE FISHERIES

The recent studies carried out 1999 and 2000 confirm and validate the findings of the previous cost and earnings studies carried out between 1995 and 1997. Out of the 108 types of fishing vessels studied in 15 South American/ Caribbean, European, African and Asian countries, 105 or 97% had a positive gross cash flow and fully recovered their cost of operation. Only three types of vessels i.e. stownetters in China and semi-industrial and industrial shrimp and bottom fish trawlers in Trinidad and Tobago showed operational losses. When also considering the cost of capital i.e. the cost of depreciation and interest, 92 out of the 108 types of vessels or 85% showed a net profit after deducting the cost of depreciation and interest. This picture is even more positive as the one obtained from the various types of fishing vessels studied during the period 1995-1997 when only 61 out the 84 types of vessels studied or 73% had a positive net cash flow. The more positive picture is largely due to the inclusion of Norway, Thailand and two of the Caribbean countries where all types of fishing units studied showed net profits.

In the 10 countries, which participated in the previous as well as in the recent study, two countries showed marked improvements in the profitability of their fishing vessels i.e. France and Spain while two countries showed a declining profitability i.e. the Peoples Republic of China and Germany. In the remaining six countries i.e. the Republic of Korea, Indonesia, India, Senegal, Argentina and Peru, the situation was similar as during the previous study carried out between 1995 and 1997.

These overall positive results were also achieved because of higher prices paid to producers as compared to the previous study period. There were only few indications that fishing effort had been reduced and fish stocks had recovered. It was also observed that some fishing fleets had adapted themselves to new conditions dictated by depleted and changing abundance of resources and new access to markets in the context of globalisation by changing their fishing operations.

Examples of new trends in coastal fisheries include the expansion of use of trammel nets by traditional log rafts (kattumarams) on the Indian east coast, introduction of mini outrigger trawlers fishing for shrimp and demersal species in shallow waters off the Indian coast of Orissa and Bengal, replacement of day-boats by so called ice boats with improved onboard preservation facilities in the flying fish fishery of Barbados, modernisation and improvement of sloops and launches in Antigua and Barbuda to cater to the requirements of export markets, diversification of purse seining and pole and line fishing in Indonesia and modernisation and upgrading of coastal vessels in the case of Thailand, Norway, France and Germany.

In offshore fisheries, the expansion/development of new profitable fisheries with high capitalisation and technology was observed. Examples include French and Spanish tuna seiners, German pelagic trawlers, Norwegian combination vessels equipped for pelagic trawling and purse seining as well as the operation of tuna longliners in India and Indonesia.

Those vessels, which had previously shown positive results but now incurred losses, were generally older vessels due to the fact that they continued to work on overexploited stocks. Examples are Chinese bottom pair trawlers of 25 to 28 m length, Chinese single bottom trawlers of 26 m length, Chinese stow-netters of 30,5m length and Chinese purse seiners cum set netters of 36 m length, which all show net losses and the stow netter even operational losses while previously only the pair trawlers had shown a net loss though no operational losses. Indian purse seiners of 14 m length fishing mackerel and sardine in the Arabian Sea also showed net losses while previously making a net profit.

Senegalese purse seiners targeting small pelagics and fishing off the West African coast, which previously showed net profits had now turned to net losses though still recovering their cost of operations.

The situation also deteriorated for German cutter trawlers of 22 m to 32 m length fishing demersal fish stocks in North Sea and Baltic Sea as well as for German factory trawlers of 60 m to 80 m length fishing demersal fish resources off Greenland and in the waters of the European Union, which all show net losses though no operational losses while they previously showed a net profit.

Spanish pole and line vessels of 24 m also had turned to making net losses after making a net profit during the previous study period.

Types of vessels which had turned from making net losses to showing a net profit as compared to the previous studies include three types of Spanish tuna seiners of 56 m, 64 m and 70 m length and deep-sea trawlers of about 30 m length and three types of deep sea trawlers ranging from 15 to 24 m length.

While the cash flows and costs of depreciation and interest of each of the fishing fleets covered by the study are shown in ANNEX I, both negative and positive economic and financial results of fishing vessels are highlighted below.

2.1.1 Fishing vessels with negative economic results

As mentioned above, 16 out of the 108 types of fishing vessels covered by the study showed negative economic results after deducting costs related to depreciation and interest. The vessels with negative economic results included Chinese, Indian, Senegalese, Norwegian, German and French vessels as well as vessels from Trinidad and Tobago. Of these vessels, however, 13 had still a positive gross cash flow and only three types of vessels suffered operational losses.

More specifically, the findings were as follows.[7]

China

Compared to the previous study carried out between 1995 and 1997, catch rates and profitability generally declined, particularly in trawling. In 1998, many boats had to shift the operations away from East China Sea to the South China Sea, as fisheries resources, both demersal and pelagic resources are overexploited and at the time of the study domestic prices for fish were declining. Three types of fishing vessels targeting demersal resources, which were covered by the study and which have been or are still fishing in the East China Sea had negative results after deducting the cost of depreciation and interest targeting demersal These vessels were bottom pair trawlers of 25 to 28 m length (net loss: $ 17 154), single bottom trawlers of 26 m length (net loss: $ 3 370), stow netters of 30,5m length (net loss: $ 16 930), purse seiners cum set netters of 36 m length (net loss: $ 19 731). Of these four types of vessels, only the stow netter also suffered operational losses while the two types of trawlers and the purse seiner cum set netter recovered their costs of operation and had positive gross cash flows.

India

Of the Indian vessels covered by the study, only one type of fishing vessels had a loss i.e. the purse seiners of 14,6 m length fishing in the Arabian Sea (net loss: $ 2 117). The reason for this seems to be the overexploitation of their main target species i.e. mackerel and oil sardine. The purse seiners, however, still recovered their costs of operation and had a positive gross cash flow.

Senegal

Both types of industrial vessels fishing from Senegal had negative economic results at the time of the study i.e. deep sea trawlers (net loss: $ 24 429) and purse seiners targeting small-pelagics and fishing off the West African coast (net loss $ 39.596). Overcapitalization, high maintenance costs and low yields on fully exploited resources fished in competition with artisanal fisheries seem to be the main reasons for the unsatisfactory economic performance. Both types of vessels though still had a positive gross cash flow and recovered their costs of operations.

Norway

In the sample covered hy the study, only one type of fishing vessel had negative results after considering the costs of depreciation and interest i.e. Norwegian pout trawlers of 35 m length fishing in the North Sea and Skagerrak (net loss: $ 117.243). The reason for their unsatisfactory economic performance was that the resources fished by pout trawlers had fallen to a very low level. They are, however, recovering as indicated by recent surveys. As in most of the other case, Norwegian pout trawlers still had a positive gross cash flow and recovered their costs of operation.

Germany

Three types of German fishing vessels had net losses after deducting the costs of depreciation and interest i.e cutter trawlers of 22 m to 25 m length ($ 11.251) and cutter trawlers of 28 m to 32m length (net loss: $ 33.692) fishing demersal fish stocks in North Sea and Baltic Sea as well as factory trawlers of 60 m to 80 m length fishing demersal fish resources off Greenland and in the waters of the European Union (net loss: $ 225.569). Different levels of overcapitalization and low yields due to overexploitation seem to be the main reasons for the unsatisfactory performance. All three types of vessels though recovered their cost of operations and had a positive gross cash flow.

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[7] For detailed cash flows see ANNEX I.

France

Of the 11 different types of French fishing vessels covered by the study, only the deep sea trawlers of 17 m to 19 m length fishing for Norwegian lobster in the North Sea had negative results after taking into account the costs of depreciation and interest (net loss: $ 13.927). Low yields on by-catches of demersal fish from overexploited stocks explain the result. The French Norwegian pout trawlers still had a positive gross cash flow and recovered their cost of operation.[8]

Spain

Of the 10 types of Spanish fishing vessels studied, two had negative economic results after considering the cost of depreciation and interest. Both vessels are pole and liners of 18 and 24 m and their net losses amounted to $ 13 636 and $ 17 881, respectively. As boats of these classes of vessels in Spain are rather old with reasonable levels of depreciation and as they are targeting Albacore tuna the stock of which is in a good condition, the negative results should be considered as transitory and not as caused by overcapitalisation or overexploitation. Both types of vessels had positive gross cash flows and fully recovered their costs of operation.

Trinidad and Tobago

Of the five South American and Caribbean countries included in the study, only two types of fishing vessels in Trinidad and Tobago had negative net results. These were semi-industrial trawlers of 9-12 m length fishing in the Gulf of Paria for shrimp and bottom fish (net loss: $ 2446) and industrial trawlers of up to 24 m length exploiting the same resources in the Gulf of Paria as well as in the Columbus Channel and off the North coast of the country. The semi-industrial and industrial trawlers from Trinidad and Tobago though showed still a positive gross cash flow and more than recovered their costs of operation. The negative results after depreciation and interest could possibly be explained by the rather limited resources fished. Shrimp resources in the Gulf of Paria have been intensively exploited since 1990 and overfishing might already have occurred as early as 1993.

On the other hand, in the workshop, where the findings of the studies were discussed, participants from other Caribbean countries raised the question whether the earnings of these types of vessels were under-reported as similar vessels in neighbouring countries fishing the same resource had positive economic results after depreciation and interest.

2.1.2 Fishing vessels with positive economic results

Out of the 108 types of fishing vessels studied in 15 South American/Caribbean, European, African and Asian countries Caribbean over the period 1998 - 2000, 105 or 97% had a positive gross cash flow and fully recovered their cost of operation. Only three types of vessels i.e. stow netters in China and semi-industrial and industrial shrimp and bottom fish trawlers in Trinidad and Tobago showed operational losses. When also considering the cost of capital i.e. the cost of depreciation and interest, 92 out of the 108 types of vessels or 85% showed a net profit after deducting the cost of depreciation and interest.

The economic performance and financial performance (where information on cost of capital investment is available) of the types of vessels with positive net results after deducting the cost of depreciation and interest are shown below. The economic performance is assessed through the ratio net profit/total earnings (NP/TE). The financial performance is assessed through the ratio net profit/capital investment also called return on investment (ROI).

China

Of the seven types of Chinese fishing vessels studied, only three made a net profit after deducting the cost of interest and depreciation i.e. squid jiggers, set netters and three boat purse seiners. There results though were not as good as during the previous study period. As mentioned above, the difficult economic situation of Chinese marine capture fisheries was caused by overfishing in the East China Sea and related restrictions and closing of fishing grounds introduced by the Government and by declining domestic fish prices. Two of the economically successful types of vessels were targeting demersal resources and one fished pelagic resources.

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[8] It was reported in the workshop that other types of French industrial trawlers not covered in the survey are also known as having negative net results i.e. trawlers of 33-38 m length and trawlers of 50-55 m length fishing overexploited resources in North Sea and North Eastern Atlantic. No data could be obtained, however, regarding the operation of these vessels.

Regarding differences in their cost structure, it can be noted that purse seiners have relatively higher labour costs and fishing gear maintenance and repair expenses than single trawlers.

TABLE 1
Positive economic results of Chinese fishing vessels

Demersal fishing

	NP/TE
Set netter, 29.5 m	54 %
Squid jigger, 43.5 m	22 %

Pelagic fishing

	NP/TE
Purse seining (3 boats)	27 %

As above figures show, Chinese squid jiggers, set netters and purse seiners operated very efficiently during the year of the study and managed to adjust themselves to restrictions regarding the access to traditional fishing grounds and to a decline of domestic fish prices. This was achieved through exploration of new fishing grounds and by reducing the cost of operation. As a result, the wages of crew onboard set netters, stow netters and bottom trawlers declined considerably when compared to the previous study carried out in China.

Republic of Korea

All 10 categories of Korean vessels operated profitably as shown below. Eight types of vessels were targeting demersal resources and two pelagic resources.

TABLE 2
Positive economic/financial results of Korean fishing vessels

Demersal fishing

	NP/TE	ROI
Offshore stow netter	2 %	2 %
Offshore squid jigger	2 %	1 %
Eastern Sea trawler	32 %	40 %
Large otter board trawler	28 %	23 %
Large pair trawler	23 %	44 %
Large Danish seiner	28 %	73 %
West South Sea medium Danish seiner	22 %	23 %
Eastern Sea medium Danish seiner	29 %	27 %

Pelagic fishing

	NP/TE	ROI
Large purse seiner	27 %	26 %
Anchovy midwater trawler	21 %	27 %

While trawlers and seiners performed very well, Korean stow netters and squid jiggers showed rather modest results.

Both types of pelagic fishing vessels i.e. purse seiners and midwater trawlers performed well.

Thailand

All 10 types of Thai vessels included in the study operated profitably as shown below. Six of the vessels were involved in demersal fishing operations and four in pelagic fishing.

TABLE 3
Positive economic/financial results of Thai fishing vessels

Demersal fishing

	NP/TE	ROI
Otterboard trawler, 14m	8 %	18 %
Otterboard trawler, 14 - 18m	12 %	21 %
Otterboard trawler, 18 - 25m	11 %	18 %
Pair trawler, 14 - 18m	1 %	5 %
Pair trawler, 18 - 25m	34 %	80 %
Push netter, < 14m	2 %	4 %
Push netter, 14 - 18m	2 %	2 %
Push netter, 18 - 25m	2 %	2 %

Pelagic fishing

	NP/TE	ROI
Purse seiner, < 14m	30 %	60 %
Purse seiner, 14 - 18m	28 %	49 %
Purse seiner,18 - 25	32 %	51 %
Anchovy falling netter, < 14 m	18 %	21 %

Except for the push netters and pair trawlers of 14-18m length, other Thai fishing vessels exploiting demersal resources reached good to excellent economic and financial results even though the fisheries resources they exploit are already fully or overexploitated. It seems unlikely that the present economic performance can be sustained also in future unless strict management measures are introduced.

Recently, the use of push nets has been banned in many areas of Thailand as this non-selective gear damages the sea bottom and has a destructive effect on fisheries resources and on the coastal environment. In this context it is interesting to note that push netters are less profitable than otter board trawlers of the same size.

Regarding the profitability of trawlers it is intersting to observe that in the case of smaller trawlers of 14 to 18 m length, single trawling is more profitable than pair trawling as the increased cost of operation of pair trawling is not matched by an equal or even higher increase in catches. In the case of larger trawlers of the length range of 18-25 m, however, pair trawling is more profitable than single trawling as the increase in catch is proportionally higher than the increase in costs.

All types of Thai fishing vessels included in the study that exploit pelagic resources had excellent economic and financial results With the exception of the 18-25 m pair trawler, purse seiners have been more profitable in Thailand than trawlers.

Indonesia

The Indonesian sample consisted of pelagic fishing vessels only as trawling is banned in Indonesian waters. All of the seven types of vessel covered by the study in Indonesia showed a net profit after deducting the cost of depreciation and interest.

TABLE 4

Positive economic/financial results of Indonesian fishing vessels

Demersal fishing	NP/TE	ROI
Java Sea purse seiner, 30-40 GT	26 %	23 %
Java Sea purse seiner, 100-120 GT	16 %	19 %
Bali Strait purse seiner, 29 GT	26 %	25 %
Skipjack pole and liner, 10-15 GT	9 %	27 %
Skipjack pole and liner, 40-50 GT	15 %	18 %
Tuna longliner, 67 GT	11 %	11 %
Gillnetter, 27 GT	22 %	22 %

Above figures show that all types of fishing vessels studied in Indonesia had very satisfactory economic and financial results. In terms of financial efficiency or return on investment, the smaller pole and liner and the Bali Strait purse seiner were the most efficient types of vessels and the tuna longliner the least efficient. In terms of economic performance or the ratio of net profit to total earnings, the Bali Strait purse seiner and the smaller Java Sea purse seiner were the most succesful types of vessels and the smaller pole and liner and the tuna longliner the least successful ones.

India

Of the eight types of fishing vessels covered by the study in India, eight showed a net profit after deducting the cost of interest and depreciation. Six of these vessels were targeting demersal resources and one pelagic resources.

With the exception of the gillnetter/trawler, all categories of Indian fishing craft. included in the study, which exploit demersal resources showed good to excellent results. The best results were shown by the smaller vessels.

TABLE 5

Positive economic/financial results of indian fishing vessels

Demersal fishing	NP/TE	ROI
Wooden kattumaram, 5.5 m	76 %	387 %
FRP Gillnetter, 8.5 m	38 %	81 %
Dolnetter, 9-12 m	39 %	75 %
Gillnetter/trawler, 16.8 m	3 %	7 %
Stern trawler, 18.8 m	13 %	14 %
Outrigger trawler, 12.8 m	17 %	17 %
Pelagic fishing	NP/TE	ROI
Tuna longliner 36 m	15 %	20 %

The good economic and financial results of Indian tuna longliners fishing in the Indian Ocean confirm the validity of the orientation towards exploiting so far underexploited offshore resources.

Different from the case of Thailand and as mentioned above, purse seiners in India fishing in the Arabian sea have been less profitable than trawlers during the period of study because of the overexploitation of their main target species i.e. mackerel and oil sardine.

Senegal

Of the six types of vessels covered by the study in Senegal, four showed a net profit after deducting the cost of depreciation and interest. Two were targeting demersal resources and the other two pelagic ones.

TABLE 6

Positive economic/financial results of Senegalese fishing vessels

Demersal fishing	NP/TE	ROI
Handliner, 12-14 m	7 %	55 %
Multipurpose canoe, 7-12 m	3 %	10 %
Pelagic fishing	NP/TE	ROI
2 canoe purse seining, 12-15 m and 18-20 m	19 %	52 %
Encircling gillnetter, 10-17 m	5 %	12 %

The good performance of the Senegalese handliners is related to increased prices for exported fish. Above figures confirm the efficiency of Senegal artisanal purse seiners already shown in the previous study in Senegal.

Norway

All twelve types of Norwegian fishing vessels covered by the study showed a net profit after deducting the costs of depreciation. Ten of the types of vessels targeted demersal resources and two pelagic ones.

TABLE 7

Positive economic/financial results of Norwegian fishing vessels

Demersal fishing	NP/TE
Factory trawler, 60.7 m	5.0 %
Freshfish trawler, 46.7 m	7.0 %
Gillnetter, 10 m	3.0 %
Gillnetter, 15.4 m	7.0 %
Coastal fishing boat, South Norway, 10 m	0.3 %
Coastal fishing boat, South Norway, 14.8 m	8.0 %
Longliner, North Norway, 10.6 m	5.0 %
Longliner, North Norway, 15.1 m	8.0 %
Shrimp trawler, 11.1 m	0.2 %
Shrimp trawler, 15.3 m	2.0 %

Pelagic fishing	NP/TE
Purse seiner, 25 m	7 %
Danish seiner, 17.6 m	2 %

Above economic results of vessels targeting demersal resources are rather modest but show an improvement as compared to previous years. They also suggest that after several years of improved efforts in fishery management in Norway, coastal fisheries are again on the right track towards economic viability and sustainability.

The results suggest that coastal purse seining in Norway is presently less profitable than industrial one (not covered in this report), but still economically viable.

Regarding the relationship between size of vessel and profitability it is interesting to observe that in the case of all types of vessels shown in above table i.e. gillnetters, coastal fishing boats, longliners and shrimp trawlers, larger vessels were more profitable than their smaller counterparts.

Germany

Of the seven types of German fishing vessels covered by the study, four showed a net profit after deducting the cost of depreciation and interest. Of these, three types of vessels were involved in demersal fishing and one in pelagic fishing.

TABLE 8

Positive economic/financial results of German fishing vessels

Demersal fishing	NP/TE	ROI
Inshore vessel, 10-12 m	3 %	2 %
Cutter trawler, 15-20 m	21 %	12 %
Shrimp trawler, 15-20 m	11 %	8 %

Pelagic fishing	NP/TE	ROI
Pelagic trawler, 60/80 m	10 %	9 %

Coastal trawlers reach reasonable to good results while bigger ones, as shown in the previous chapter, have negative results due to insufficient fishery resources, heavy fuel and marketing costs as well as higher depreciation charges.

Large German pelagic trawlers working partly off the African coast within the framework of European Union fishing agreements show a satisfactory economic performance.

It is also interesting to note that cutter trawlers catching demersal fish are more profitable than shrimp trawlers of the same size, mainly because of lower costs of operation.

France

Of the eleven types of French fishing vessels covered by the study, ten showed a net profit after deducting the cost of depreciation and interest. Of these, eight were fishing demersal resources and two pelagic ones.

TABLE 9

Positive economic/financial results of French fishing vessels

Demersal fishing	NP/TE
Handliner, 8-10 m	29.0 %
Gillnetter, 10-12 m	6.0 %
Gillnetter, 12-20 m	9.0 %
Coastal trawler, 12-14 m	4.0 %
Coastal trawler, 14-16 m	0.5 %
Deep sea trawler 15-17 m	8.0 %
Deep sea trawler 19-20.5 m	9.0 %
Deep sea trawler 20.5-24 m	7.0 %

Pelagic fishing	NP/TE
Atlantic coastal seiner, 15 m (sardine, anchovy)	17 %
Mediterranean purse seiner, 27-33 m (bluefin tuna)	12 %

The best performance of vessels targeting demersal resources is shown by small-scale handliners targeting high value fish.

Above findings show that after a long period of decline, coastal purse seining for small pelagics has again become profitable. In comparison, purse seiners targeting bluefin tuna in the Mediterranean have almost always been profitable and showed a good economic performance also at the time when the study was undertaken.

When comparing the performance of coastal trawlers and giillnetters, it is interesting to note that gillnetters are more profitable than trawlers, which have lower costs of operations than gillnetters but even lower earnings.

Spain

Of the ten types of Spanish fishing vessels covered by the study, eight showed a net profit after deducting the cost of depreciation and interest.

All trawlers show similarly modest positive results.

The Spanish Oceanic tuna fishing fleet showed a satisfactory economic performance and can be expected to continue to do so as long as international prices stay at the level as in 1998 when the data was collected. When comparing different sizes of tuna longliners it is interesting to note that the smallest size of 56 m length showed the best economic peformance.

TABLE 10

Positive economic/financial results of Spanish fishing vessels

Demersal fishing[*]	NP/TE	ROI
Trawler, 20-35 m, Gulf of Biscay	6 %	3 %
Trawler, 25-35 m, off Portuguese coast	7 %	3 %
Trawler, 30-45 m, Gulf of Biscay-West Ireland	5 %	2 %
Pelagic fishing	**NP/TE**	**ROI**
Tuna seiner, 56 m	14 %	n.a.
Tuna seiner, 64 m	9 %	n.a.
Tuna seiner, 70 m	8 %	4 %

Antigua and Barbuda

Of the seven types of fishing vessel of Antigua and Barbuda covered by the study, all were targeting demersal resources i.e. lobster and bottom fish and all were operating profitably.

TABLE 11

Positive economic/financial results of Antiguan & Barbudan fishing vessels

Demersal fishing	NP/TE	ROI
Open Antigua type trap and line fishing boat, 6.3 m	60.0 %	128.0 %
Open Barbuda type trap and line fishing boat, 6.9 m	74.0 %	260.0 %
Cabin type trap and line fishing boat, 6.8 m	52.0 %	34.0 %
Trap and line fishing sloop, 11.2 m	0.1 %	0.1 %
Trap and line fishing wooden launch, 11.8 m	40.0 %	55.0 %
Trap and line fishing FRP launch, 9.5 m	46.0 %	49.0 %

The economic results for all vessels targeting lobster and bottom fish look very promising except for the sloop which just reach the break even point.

Barbados

Both fishing vessels covered by the study in Barbados were targeting the pelagic flying fish resource and showed a net profit after taking into consideration the cost of depreciation and interest.

TABLE 12

Positive economic/financial results of Barbadian fishing vessels

Pelagic fishing	NP/TE	ROI
Flying fish fishing day boat, 9 m	5 %	4 %
Flying fish fishing ice boat 12 m	16 %	8 %

The table shows that in Barbados, larger boats with insulated fish holds targeting flying fish and undertaking longer trips have better economic and financial results than smaller boats, which undertake only day trips, probably because of relatively lower fuel expenses and running costs.

Trinidad and Tobago

Of the three types of shrimp trawlers studied in Trinidad and Tobago, only the smallest one shows a net profit while semi-industrial and industrial ones incur losses.

TABLE 13

Positive economic/financial results of Trinidadian fishing vessels

Demersal fishing	NP/TE	ROI
Artisanal trawler, 8-10 m	8 %	21 %

In Trinidad and Tobago, small-scale shrimp trawlers are profitably operated while larger shrimp trawlers suffer operational losses as shown in the previous chapter. Because of their lower running costs and scale of operation, they seem to be superior to larger vessels in an area with scarce demersal fisheries resources.

Argentina

All three types of vessel covered by the study in Argentina targeted demersal resources and showed a net profit. However, the results are not as good as during the previous period of study. While running costs have generally increased over the last few years catches and earnings declined.

Inspite of strict limitations on hake fishing in Argentina, ice trawlers still seem to have positive economic results

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[*] Only three of the five types of Spanish trawlers are shown in this table as the other two not shown have very similar technical specifications and only fish in different fishing grounds but show similar results.

TABLE 14

Positive economic/financial results of Argentinian fishing vessels

Demersal fishing

	NP/TE	ROI
Hake trawler, 25 m	10 %	7 %
Hake trawler, 30 m	17 %	12 %
Hake trawler, 35 m	24 %	17 %

but in order to achieve and sustain these results, crew wages and shares have severely dropped since 1996.

Peru

Of the five types of vessels studied in Peru, two targeted demersal resources and three fished pelagics. All types of vessels show a net profit after deducting the cost of depreciation and interest.

TABLE 15

Positive economic/financial results of Peruvian fishing vessels

Demersal fishing

	NP/TE	ROI
Hake trawler, fishhold:102 m³	1 %	3 %
Hake trawler, fishhold: 120 m³	2 %	5 %

Pelagic fishing

	NP/TE	ROI
Purse seiner, fishhold: 200 m³	8 %	n.a
Purse seiner, fishhold: 350 m³	8 %	7 %
Purse seiner, fishhold 650 m³	8 %	5 %

Compared to hake trawlers in Argentina, hake trawlers in Peru have a lower profitability due to high fuel costs (nearly 50% of TE) and of a comparatively lower price for hake (132$ / ton).

As the price of fish meal was lower in 1999/2000 compared to the 1996/1998 period when the previous study was untertaken in Peru, it resulted in a less favourable performance of purse seiners in Peru, which nevertheless still performed reasonably well. Considering the performance of different sizes of purse seiners in Argentina, their economic results are very similar.

2.2 The impact of Government financial transfers on the financial performance of marine capture fisheries

Working group 1 of the inter-regional workshop on the "Techno-Economic Performance of Marine Capture Fisheries and the Role of Economic Incentives, Value Addition and Changes of Fleet Structure" examined the impact of Government financial transfers on the financial performance of individual fishing enterprises in seven selected countries of East, South-east Asia, South Asia and of Europe i.e. the Peoples Republic of China, the Republic of Korea, Thailand, India, Norway, France and Germany [10]. The authors of the country case studies carried out the analysis. In addition to the information contained in the country case studies, which is summarised in APPENDIX 1, the authors had brought with them additional information on Government financial transfers to the fishing industry in their respective countries and used this information in their calculations.

The following picture emerged regarding the impact of Government financial transfers on the profitability of fishing operations.

China

Since 1999, the Government of the Peoples Republic of China tries to control fishing effort and to limit the expansion of fishing capacity in order to protect fish resources. A strategy of "zero growth" of marine capture fisheries is being implemented and the Government tries to prevent an increase in the number of fishing vessels. The management measures, which are in place, include licensing systems for fishing vessels by fishing areas, closed areas and seasons and the establishment of MSYs and MEYs for commercially important species. In line with this policy, Government financial transfers to marine capture fisheries have been greatly reduced. At present, capital subsidies and loans are provided in China on a limited scale by fisheries authorities and local Government authorities for only two purposes, which are related to the conservation of the environment and fishery resources i.e.

- for the construction of fibreglass fishing vessels to reduce the use of wood for boat construction;
- for fishing vessels, which exploit new fishing grounds and use non-traditional (in the Chinese context) fishing methods such as oceanic long-liners, factory trawlers and large-scale squid-jigging vessels.

Of the seven types of "traditional" fishing vessels, which have been studied in China i.e. bottom pair trawlers of 25 to 28 m length, single otter board trawlers of 36 m length, set netters of 29.5 m length, stow netters of 30.5 m length, squid jiggers of 43.5 m length, 3 boat purse seiners of 27.8 m and 42.4 m length and purse seiners cum set netters of 36 m length, none availed of any direct or indirect cost reducing or revenue enhancing Government financial transfer.

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[10] In the case of Indonesia, the authors of the country study informed that at the time of the study i.e. in 2000, Indonesia had no Government financial transfers to marine capture fisheries. This means that the Indonesian fishing vessels covered by the study were profitable without Government financial transfers.

As mentioned in the previous chapter and shown in ANNEX I, two out of the seven types of vessels showed a negative gross cash flow i.e. the stow netter and the purse seiner cum set netter. After further deducting the cost of depreciation and interest, four out of the seven types of vessel show a net loss i.e. the previously mentioned two types of vessel and also the bottom pair trawler and the single otter board trawler, which still had a positive gross cash flow.

In terms of topics for further study on economic incentives issues and Government financial transfers in the case of China, it was proposed to study the economic impact of subsidies in support of exploitation of new fishing grounds and use of new fishing methods and to identify suitable economic incentives for the facilitation of occupational change from marine capture fisheries to coastal aquaculture.

Republic of Korea

The Republic of Korea is presently implementing a fisheries structural adjustment programme with a view to reduce fishing fleet capacity. This programme also includes a fishing vessel "buy back" component under which the Government makes direct payments to fishing vessel owners for decommissioning of fishing vessels. With the view to ensure the economic viability of the presently operating fleet, Korea has a number of revenue enhancing and cost reducing Government financial transfers in place. These include price support payments, crew insurance support, tax exemptions on fuel and income tax exemptions for distant-water vessels, favourable interest rates for loans and other cost reducing transfers.

A comparison of the economic performance of the eight types of Korean vessels, which have been covered by the study with and without cost reducing and revenue enhancing Government financial transfers is shown in table 16 below. It is obvious that without subsidies, three out of the eight types of vessels covered by the study i.e. offshore stow netters, offshore jigging vessels and Eastern Sea trawlers would have a negative gross cash flow while the other five types of vessels i.e. large purse seiners, anchovy mid-water trawlers, large otter board trawlers, large pair trawlers, large Danish seiners and Eastern Sea trawlers would still have a positive though much reduced gross cash flow.

When considering the net profit (after deducting the cost of depreciation and interest) of the five types of Korean vessels, which had a positive gross cash flow also without subsidies, four would also still earn a net profit without subsidies and only one i.e. the large pair trawler would show a net loss. However, Government financial transfers contributed substantially to the gross cash flows and net profits of all types of Korean fishing vessels covered by the study.

The findings suggest, that during the year in which the cost and earnings data were collected, subsidies in the form of revenue enhancing and cost reducing Government financial transfers were necessary for only half of the eight types of Korean vessels studied to ensure that the vessels recovered their cost of operation and also generated enough income for reinvestment. The other half of the types of Korean vessels studied would have also been economically viable without subsidies and the subsidies actually played the role of increasing their profitability.

TABLE 16

Gross cash flow and net profit of Korean fishing vessels with and without revenue enhancing and cost reducing Government financial transfers (in US$)

Type of Vessel	offshore stow netter	offshore jigging vessel	Eastern Sea trawler	Purse seiner	anchovy midwater trawler	otter board trawler	pair trawler	Danish seiner
Gross cash flow without subsidy	- 38 781	- 24 927	- 50 380	763 715	107 268	109 470	13 048	29 943
Net profit/loss without subsidy	- 50 359	- 46 130	- 62 475	472 583	49 710	8 204	- 23 559	20 683
Gross cash flow with subsidy	15 096	24 573	80 666	1 402 354	298 826	431 307	261 515	104 360
Net profit/loss with subsidy	3 518	3 370	68 571	1 111 222	241 269	330 041	224 908	95 100

The three types of vessels which depended on subsidies even for a positive gross cash flow were interestingly enough two off-shore vessels i.e. the stow netters and the jigging vessels as well as trawlers fishing in the over-fished Eastern Sea.

Thailand

Government policies aim at the reduction of fishing effort and fleet in the Gulf of Thailand and diversification of fishing effort to fishing grounds for tuna in the Thai EEZ and to fishing grounds outside the Thai EEZ through joint ventures and fishing agreements with neighbouring countries. As the overcapacity in the Thai fishing fleet is commonly acknowledged, Government financial transfers to marine capture fisheries in Thailand have been greatly reduced over the past decades. There are presently neither special capital subsidies available for the purchase of fishing craft and gear nor are there tax exemptions for the purchase of fishing inputs.

The only subsidy programme presently operated is the so-called diesel price reduction programme, which was recently introduced when fuel prices drastically increased. The programme consists of a tax exemption on fuel for certain types of vessels. The programme aims to ensure the profitability of certain types of fishing vessels in the light of sudden fuel price increases and thus to safeguard income and employment by reducing the operating costs of certain types of vessels on which the increase in the price of fuel had a particular negative impact. The need for the programme arose in the context of steep global and local increases in the price of diesel and unfavourable local currency exchange rates as a result of the financial crisis in Thailand and Southeast Asia.

Under this programme, owners of certain types of fishing vessels obtain discounted coupons for the purchase of diesel. Diesel can be purchased for 64% of the market price, which basically means that they are exempted from paying taxes on diesel. The fishing vessels need to be not longer than 18 m and they need to register under the programme. Only certain types of fishing vessel can register i.e. those operating otterboard trawls, pair trawls and push nets. At present, 78% of all vessels of above specifications i.e. 5 000 vessels are registered under the diesel price reduction programme.

Of the 12 types of otterboard trawlers, pair trawlers, push netters purse seiners and anchovy cast netters, which were covered by the Thai study, five types were eligible for the fuel subsidy programme. As mentioned in the previous chapter and also shown in ANNEX I, all 12 types of Thai vessels had positive gross cash flows as well as net profits.

The table below shows the impact of the tax exemption on diesel on fuel expenses, total running costs and on the gross earnings of the five types of vessels, which are eligible for the tax exemption.

The figures show that in the case of the five types of vessels, which had tax exemptions on fuel, their positive gross earnings were only achieved because of the tax exemption. Otherwise, their gross cash flows would have been negative. Thus these vessels actually depended on the fuel subsidy for their profitability while the other types of vessels, which were not eligible for fuel subsidies, did not. The diesel price reduction programme seems to have met its objectives by assisting exactly those types of vessels, which needed it for their profitability.

In the case of Thailand it can be assumed that measures like the diesel price reduction programme can only support economic viability in the short run as long as the problem of excess fishing fleet capacity is not resolved.

TABLE 17

Gross cash flow, fuel expenses and total running costs of Thai fishing vessels with and without revenue enhancing and cost reducing Government financial transfers (in US$/year)

Type of Vessel	Fuel expenses			Total running costs			Gross cash flow	
otterboard trawler	with subsidy	without subsidy	difference	with subsidy	without subsidy	difference in%	with subsidy	without subsidy
< 14 m	7 178	11 280	4 102	9 770	13 878	42	2 046	- 2 056
14 - 18 m	23 270	36 584	13 264	17 108	30 372	77.5	6 969	- 4 296
pair trawler 14 - 18 m	48 448	76 063	27 615	53 247	80 862	51.8	4 832	- 22 333
pushnetter < 14 m	4 453	6 990	2 837	5 476	6 013	46.3	846	- 1 691
14 - 18 m	16 703	29 314	10 661	21 064	31 775	50 6	2 478	- 8 183

In terms of topics for future consideration and study with regard to Government financial transfers in Thailand, the following ones were suggested:

- impact of "indirect" Government financial incentives/economic incentives such as low licence fees and low harbour fees on fleet capacity
- use of Government financial transfers/economic incentives to counter negative socio-economic implications of reduction of fishing fleet capacity
- assessment of the cost of fisheries management and enforcement

India

In India as in other Asian countries, Government financial transfers to the fisheries sector have been gradually reduced over the last decades both in terms of funds transferred and in terms of programmes operated. At present, cost reducing Government financial transfers are available mainly for three segments of the fishing industry i.e. the small-scale fisheries sector with a view to improve incomes and well being of artisanal fisherfolk, for export oriented fish processing and marketing and for deep sea fishing.

Government financial transfers to small-scale fisheries are provided in the form of capital subsidies and direct payments for the construction of small wooden and FRP boats and the purchase of fishing gear (15% of the investment cost) and for the motorization of traditional fishing boats. In the latter case, the Government contributes Indian Rupees 10 000 and 12 000 respectively to the purchase and installation of outboard and inboard engines on traditional fishing boats.

There is also a small reduction on the price of diesel for fishing vessels of less than 20 m length, which amounts to Rs 0.35 per litre and which is basically a modest tax exemption.

Of the eight types of fishing boats covered by the study in India, only two were eligible for subsidies i.e. a sailing wooden log raft (kattumaram) of 5.5 m length using trammel nets and a 8.5 m motorised fishing boat using gillnets and hook and line.

The table below compares their performance with and without subsidies.

TABLE 18

Gross cash flow, fuel expenses and total running costs of Indian kattumaram fishing boat with and without cost reducing Government financial transfers (in Indian Rupees)

	without subsidy	*with subsidy*
Investment cost	35 375	21 569
Cost of operation	25 604	25 604
Income	129 600	129 600
Gross profit	103 996	103 996
Depreciation and interest	5 079	4 313
Net profit	98 917	99 683

TABLE 19

Gross cash flow, fuel expenses and total running costs of Indian gillnet/hook and line fishing boat with and without cost reducing Government financial transfers (in Indian Rupees)

	without subsidy	*with subsidy*
Cost of boat	100 000	85 000
Cost of fishing gear	61 500	52 275
Cost of outboard engine	30 000	20 000
Total investment cost	191 500	157 275
Cost of operation	145 808	143 308
Income	308 556	308 556
Gross profit	162 748	165 248
Depreciation and interest	40 100	32 655
Net profit	122 648	132 593

The figures show that both types of small-scale fishing boats also generate a net profit without subsidies and that the subsidies only lead to a slightly higher profitability of the fishing boats.

In terms of future studies on the use of Government financial transfers to fisheries in India, it was suggested to:

- quantify the amount of cost reducing and revenue enhancing Government financial transfers by sector of the fishery industry and relate it to the value of production including Government financial transfers to fish marketing and processing
- assess impact of Government financial transfers on various segments of the fishery industry i.e. the small-scale sector, offshore and deep sea fisheries, export oriented fish processing and marketing
- based on above, develop recommendations for continuation/discontinuation of Government financial transfers to fisheries also in the context of WTO agreements and commitments.

France

In the case of France as in the case of other members of the European Union such as Germany and Spain, which were covered by the study, the European regulations regarding subsidies apply since 1983. These regulations allow members of the European Union to provide to their fishery industry subsidies for the renewal or modernisation of their fishing fleets. Subsidy programmes have been implemented through the Financial Instruments for Fisheries Guidance (FIFG) since 1994 through co-financing of national Governments.

For the period when the cost and earnings data for France were collected, a rate of 30% of subsidy on capital investment was applicable, of which 25% was contributed by the French Government and 5% by the FIFG.

Furthermore, lower rates of interest for loans are available. The difference between average commercial rates of interest and rates of interest of fisheries loans was about 20% in 1998.

As far as the price of fuel is concerned, there are different rates on fuel for different sectors of the economy. As fisheries is not treated as a separate sector but grouped together with other sectors the fuel price is not considered here as subsidised and there are no direct Government financial transfers effecting the fuel price in France. In 1998, $ 0.15 was paid by fishing vessels in France per litre of fuel.

In order to assess the impact of subsidies on fishing vessels in France, the net results of three types of vessels are compared below, with and without capital and interest rate subsidies. The vessels are 10 to 12 m coastal gill-netters fishing on the Atlantic coast, 13 to 20.5 m trawlers fishing in the Atlantic Ocean and 27 to 33 m purse seiners fishing in the Mediterranean Sea.

The figures show that one out of the three vessel types, i.e. the coastal gill-netter would have a negative net cash flow without subsidies while the other two types of vessels i.e. the Atlantic Ocean deep sea trawlers and the Mediterranean tuna purse seiners would still have positive even though reduced net profits. In these cases, the subsidies were not really needed to ensure the financial viability of the fishing operations. The ratios of subsidies divided by total earnings show that the share of subsidies to total earnings is higher in capital intensive fisheries.

TABLE 20
Impact of subsidies on the economic performance of French fishing vessels (in US$)

Type of Vessel	Gillnetter		Deep Sea Trawler		Tuna purse seiner	
Total earnings	167 500		642 084		728 814	
Running costs	13 744		146 330		125 423	
Labour costs	79 455		255 484		279 661	
Vessel costs	39 524		145 592		101 695	
Gross cash flow	34 777		94 678		222 035	
	with subsidy	without subsidy	with subsidy	without subsidy	with subsidy	without subsidy
Depreciation	20 627	29 467	29 557	42 224	116 644	169 491
Interest	4 631	5 789	8 419	10 524	16 949	21 186
Net Profits	9 519	- 479	56 702	41 930	86 442	31 358
Subsidies/ total earnings	6 %		2.3 %		7.5 %	

Norway

The total amount of Government financial transfers to the fisheries sector in Norway in relation to the total value generated through the sale of fish can be estimated as about 5%. Subsidies have been gradually reduced in Norway where the percentage has been previously as high as 30%. Many types of subsidies have been or are being phased out such as subsidised interest rates of loans and minimum price and income support measures. The remaining subsidies are cost reducing subsidies in the form of subsidies for the purchase of bait, subsidised insurance premiums, tax exemptions on fuel and investment subsidies.

Shipbuilding including the building of fishing vessels is presently also being subsidised at the rate of 6-9%. The funds are directly transferred to the ship building yards. The percentage of subsidy, however, is to be reduced in 2001 and this is expected to result in an increase of investment costs for fishermen. Investment subsidies are generally provided for specific types of vessels and for limited periods in accordance with specific fleet plans. Economic incentives are usually provided to compensate for low profitability. Presently, large coastal fishing vessels receive investment subsidies.

With presently available information, it was found difficult to estimate how the cash flow of different types of vessels is affected by subsidies. As trawlers consume more fuel in their fishing operations than other types of vessels, they benefit more from energy subsidies. The purse seiner fleet being more capital intensive than other fishing fleets benefits more from the remaining investment subsidies.

It is possible, however, to quantify the various types of Government financial transfers in relation to the value of the total catch. It needs to be taken into consideration though that some of the subsidies shown in the table below have been or are being phased out in 2000 and 2001.

TABLE 21

Government financial transfers to the fisheries sector in Norway in relation to total catch value (in Million NOK)

	1996	1997	1998	1999
Total catch value	8795	9237	10472	9946
Direct subsidies for structural & efficiency measures	13	6	1	19
Income support	38	43	34	34
Support for social security schemes	25	26	17	13
Others	11	28	21	20
Loan subsidies (estimated) and grants	89	47	86	91
Tax exemptions and refund taxes	272	289	304	310
Total subsidies	426	439	463	489
Subsidies as % of total catch value	4.9	4.8	4.4	4.9

Germany

Subsidies available from the European Union

Since 1993, the EU provides subsidies and financial services to European fishing fleets through a called "Financial Instruments for Fisheries Guidance (FIFG)". The main purpose of the FIFG is to help achieve a sustainable balance between fishing effort and fisheries resources, which are currently under threat from overcapacity of the European fishing fleets and to improve the structure and competitiveness of the European fishery industry. The FIFG instruments can help finance a wide range of projects to restructure the entire fishery industry and can also finance social measures.

Its principle measures include the adjustment of the fleet i.e. decommissioning of vessels and the creation of joint ventures with foreign partners in order to reduce fishing effort in European Community waters. The competitiveness of the fleet is also considered crucial and the FIFG provides support for building and modernising vessels. However, resources under the FIFG can only be used if the objectives of the Multi-annual Guidance Programmes agreed between Member States and the European Commission are achieved.

Two general principles guide the allocation of FIFG funds. Firstly, the national or the regional authorities concerned must make a minimum financial contribution. When the beneficiary of the funds is a company, it, too, must invest money in the project. Secondly, the level of FIFG aid varies according to the region in which the applicant resides. A higher level of funding applies for poorer regions.

The European Community participation may be up to 75% of the costs of projects in so-called Objective 1 (poorer) regions and up to 50% in the other regions. For investments in production, these rates are 50% and 30%, respectively.

This financing has been allocated mainly through the FIFG (Financial Instrument for Fisheries Guidance) and covers the whole of Germany's fisheries sector, from fleet modernisation to port facilities, and from aquaculture to the processing and marketing of products.

The priorities of the FIFG and its areas of operation in Germany were identified jointly by the European Commission and the German authorities in two separate documents, one concerning the former East Germany, which is eligible for assistance under Objective 1 regions and the other concerning the former West Germany.

National support by federal and regional ("Laender") funds

In addition to the assistance through the European Union, the German Federal Government offers financial assistance for

- investment measures
- purchase of used fishing vessels
- diversification to passive fishing methods or other stock conserving, energy saving or quality supporting techniques.

Financial support for investment measures is provided in the form of grants, loans or loan interest rebates and generally limited to vessels with a minimum length of 12 m. In the Baltic Sea, the minimum length of boats is 9 m, and in case of fishing vessels using passive fishing gear, the minimum length is 7 m. Support is only granted if the value of the subsidy does not exceed the maximum rate fixed by the EU.

Grants are provided for

- building of new vessels (up to 25% of investment cost)
- modernisation of fishing vessels (up to 20% of investment costs)
- purchases of used vessels and for measures for diversification to passive fishing methods (up to 10% of costs).

Loans (only for the cutter deep-sea fishery) at an interest rate of 2% annually for

- construction of new vessels and purchases of vessels (up to 30% of investment costs)
- modernisation measures (up to 60% of costs).

Loan interest rebates for modernisation measures in
- the trawler deep-sea fishery (up to 3%)
- in the cutter deep-sea fishery (up to 4%).

Furthermore, financial support is granted for capacity adjustment concerning

- temporary lay-up (premiums depending on the available annual budget)
- decommissioning of fishing capacities (only for the cutter deep-sea fishery) amounting to 2 000 DM/GT.

The financial support measures granted by regional ("Laender") funds are different and contain guarantees and some smaller additional investment grants. This supplementary aid from "Laender" funds amounted to 2 million DM in 1998.

Financing of the European Union, national financing from federal budget and supplementary support from regional administrations

The following tables give an overview of the financing of the European Union, national financing from the federal budget and supplementary support from Laender funds over the Period 1994-1999.

Of the total amount of 572 million Euro paid to the German fishery industry within the years 1994-1998, only those relating to adjustment of fishing effort and fleet renewal and modernisation can be considered as cost reducing and revenue enhancing Government financial transfer to the fishing fleet. These subsidies amount to 126 million Euro within the 4 years under consideration resulting in an average of about 30 million Euro per year.

Assessment of impact of Government financial transfers on economic performance of German fishing vessels.

Unfortunately, no information is recorded to which fleet segments above cost reducing and revenue enhancing

TABLE 22

Government financial transfers in Germany - New "Laender"[1] (Brandenburg, Mecklenburg-Western Pomerania, East Berlin, Saxony. Saxony-Anhalt, Thuringia)
(ECU million)[2]

Field of action	FIFG (1)	Other EU Structural Funds (2)	National public financing (3)	Private financing (4)	Total Financing (1+2+3+4)
1. Adjustment of fishing effort	1.90	-	1.90	-	3.80
2. Fleet renewal and modernisation	20 50	-	2.05	18.45	41.00
3. Aquaculture	10 80	-	2.95	13.63	27.38
4. Protection of marine areas	1.64	-	0.54	-	2.18
5. Fishing port facilities	16 50	-	5.50	-	22.00
6. Processing and marketing of products	28 91	-	13 65	51.37	93.93
7. Product promotion	2.15	-	0.73	1 83	4 70
8. Other measures	1.10	-	1.10	-	2.20
9. Vocational training[3]	-	3 80	2.10	-	5.90
10 Socio-economic measures for fishermen	-	-	-	-	-
TOTAL	83.50	3.80	30 52	85.27	203.09

[1] Structural Fund operations in the fisheries sector in regions covered by Objective 1 (i.e. whose gross domestic product per capita is less than 75% of the Community average)

[2] In December 1995, ECU 1= approximately DM 1.88

[3] These training measures do not appear in the operational programme for fisheries in Objective 1 regions, they are financed by the European Social Fund in Mecklenburg-Western Pomerania, and appear in the chapter for that region in the Community Support Framework for the Objective 1 regions of Germany

[4] These measures became possible with the amendment of Regulation (EC) 3699/93 in November 1995. The amount of these measures is still to be determined, within the overall total appropriation

Source: European Commission

Government financial transfers have been made. Therefore, the amount of 30 million ECU (= US $) has been related to the tonnage (GT) of the different fleet segments.

Basing on this method, it has been calculated that about 485 ECU as cost reducing and revenue enhancing Government financial transfer has been paid per GT of the fishing fleet.

With a view to assess the impact of Government financial transfers on the profitability of the German fishing fleet, the following results were calculated using this admittedly rough method:

TABLE 23

Government financial transfers in Germany - Other "Laender"[1] (ECU million)[2]

Field of action	FIFG (1)	National public financing (2)	Private financing (3)	Total financing (1+2+3)
1 Adjustment of fishing effort	6.76	10.76	0.00	17.54
2. Fleet renewal and modernisation	12.11	3.71	48.15	63.97
3 Aquaculture	6.97	2.14	27.73	36.84
4 Protection of marine areas	-	-	-	-
5 Fishing port facilities	5.49	1.68	21.83	29.00
6 Processing and marketing of products	38.89	11.90	154.63	205.42
7. Product promotion	2.46	0.75	9.77	12.98
8. Other measures	1.83	1.62	-	3.45
9 Vocational training [3]	-	-	-	-
TOTAL	74.51	32.58	262.11	369.20

[1] These measures under the Structural Funds Objective 5(a) (fisheries) cover the regions not covered by Objective 1 (for Objective 1 regions, see above)

[2] In December 1995, ECU 1 = approximately DM 1.88

[3] These measures were introduced at a later stage, after the amendment of Regulation (EC) 3699/93. The amount of these measures is still to be determined, within the overall total appropriation.

Source: European Commission

TABLE 24

Impact of Government Financial Transfers on the Economic Performance of German Fishing Vessels (in DM)

Gross Cash Flow and Subsidies (1000 DM)							
Type of vessel	Inshore and cutter deep sea fisheries				Shrimp fishery	Trawler deep sea fisheries	
	Inshore vessel 10-12 m	Trawling cutter 15-20 m	Trawling cutter 22-25 m	Trawling cutter 28-32 m	Shrimper 12-20 m	Pelagic trawler 60-80 m	Groundfish trawler 60-80 m
Tonnage (GT)	10	40	130	200	40	4 500	2 180
GCF	33.9	164.2	175.2	244.7	117.7	4 873	913
Subsidies	9.1	36.5	118.5	182.4	36.5	4 163	1 988
GCF without subsidies	24.8	127.7	56.7	62.3	81.2	710	- 1 075

The figures suggest, that with the exception of the largest trawler, the other six types of German fishing vessels covered by the study still had a positive gross cash flow without subsidies. Subsidies, however, contributed significantly to the gross cash flow of larger trawlers and less significantly to the earnings of inshore vessels and smaller trawlers.

Summary

Regarding the impact of cost reducing and revenue enhancing Government financial transfers in the seven countries examined by working group I, important differences between countries could be observed. In two countries, belonging to the European Union and in India, there were strong indications that almost all types of vessels, which were covered by the cost and earnings study and which received subsidies would also have been profitable without subsidies. The subsidies played a role, however, in significantly increasing their earnings and profitability. In the Republic of Korea, the situation was mixed while in Thailand, those types of vessels, which could avail themselves of tax exemptions on fuel needed the tax exemption in order to have a positive gross cash flow.

During the discussion of the findings of working group I in plenary, it was observed that while the overall amount of subsidies provided to the economy over the last decades had greatly been reduced in most developing countries in the context of structural adjustment and financial sector reform programmes, it was noted that no detailed empirical information was available on the amount of Government financial transfers to the fishing industry. No information was available either on the impact of these types of subsidies, at the micro-level, on the financial performance of individual fishing enterprises. In the absence of this information, participants observed that in many countries, there did not seem to be any rational reason for providing subsidies.

Workshop participants from all countries expressed the view that there was a need to collect and analyse information on the quantity and impact of Government financial transfers. A study of the use and impact of Government financial transfers on fishing enterprises was identified as one of the priority areas for FAO's involvement in the future monitoring of the economic performance of marine capture fisheries.

The information to be generated by the study is expected to help to reduce and rationalise the use of scarce Government financial resources and to avoid that subsidies have a negative impact on fisheries resources and on the coastal environment. It was felt that the use of Government financial transfers should be restricted to specific situations only. These situations might include for example the diversification of fishing effort away from overexploited resources to underexploited ones and from inshore to offshore resources. They would also include protection of income and employment in artisanal fisheries in the absence of other employment opportunities. However, it was felt that Government financial transfers should always be of a limited duration and have specific justifications. Furthermore they should not lead to or sustain overfishing and have any negative impact on the coastal environment.

Regarding the kind of transfer to be used it was felt that in general, these should, as far as possible promote economic efficiency and not the development of inefficient enterprises. In this context, indirect cost reducing subsidies such as tax exemptions and provision of infrastructure were thought preferable to direct cost reducing and revenue enhancing subsidies such as capital subsidies for purchase of fishing craft and gear, price and income support measures etc.

2.3 RECENT TRENDS AND CHANGES IN THE COST STRUCTURE OF MARINE CAPTURE FISHERIES

2.3.1 Summary of findings of studies carried out between 1995 and 1997

The comparative analysis of the cost structure of marine capture fisheries of the countries studied between 1995 and 1997 focussed on the analysis of differences in the operating cost structure of two types of fisheries i.e. industrial and medium-scale trawl fisheries and small-scale fisheries in developed and developing countries.[11]

Among the more outstanding findings were that in the case of trawl fisheries, there are significant differences in the cost structure between developed and developing countries, which are related to the higher cost of labour in the former countries. In the trawl fisheries of developed countries, labour costs were the most important element followed by running costs and vessel costs while in developing countries, labour costs were less important and running costs were the most important cost element. For the same reason i.e. higher labour costs, the operating costs per unit of gross earnings were higher for trawlers in developing countries than for trawlers in developed countries.

The operating cost structure of small-scale fisheries showed some differences from the one of industrial trawl fisheries, which depended, however on the fact, whether the country were the fishing vessels operated was a developed or a developing one. In the developed countries, labour cost remained the most important cost element. Vessel costs became the second most important cost element and running costs become the least important cost element because of the lower fuel expenses. In the developing countries, however, labour costs become now the most important element of operating costs (as it was the case in the developed countries, both in case of industrial trawl fisheries and in small-scale fisheries) because of the fact that a sharing system of remuneration rather than a fixed wage system is used. For the same reason i.e. the higher importance of labour costs in small-scale fisheries in developing countries, the differences in operating costs per unit of gross earnings, which could be observed in the case of industrial trawl fisheries could not any longer be observed in the case of small-scale fisheries.

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[11] See FAO Report on the State of World Fisheries and Aquaculture 2000, FAO Rome 2000, pp 93/94

2.3.2 Findings of recent studies on cost structure of deep-sea trawlers, small-scale fishing vessels and tuna vessels

In the following chapter, three different categories of vessels are compared regarding their cost structure i. e. deep sea trawlers, small-scale fishing vessels and tuna vessels. They have been selected as they are among the economically most important vessels in terms of common use, quantity and value of catch and generation of employment. For each category of fishing vessel, first the operating costs are analysed consisting of running costs, labour costs and vessel costs and then the total costs, which also include the cost of depreciation and interest i.e. the costs of the capital invested in the fishing vessel.

Deep-sea trawlers

Operating costs

The findings of the country studies carried out recently validate and confirm the information generated by the studies carried out between 1995 and 1997 and do not indicate any major changes in the structure of the cost of operations. As illustrated in Figure 1 below, the cost of labour has remained the most important cost component of the deep sea trawl fisheries in the developed countries studied i.e. the European countries France, Norway, Germany and Spain. According to the recently collected data, the cost of labour accounts for 38% to 60% of the cost of operations. The second most important cost com-ponent of most European deep-sea trawlers is running costs closely followed by vessel costs.[12]

The six types of trawlers where vessel costs are higher than running costs include all types of Norwegian vessels i.e. shrimp trawlers, factory trawlers, pout trawlers and freshfish trawlers as well as German shrimp trawlers and large German demersal fish cutter trawlers.

In the South American countries Argentina and Peru and in the Caribbean country of Trinidad and Tobago, which have a lower level of economic development than the European countries studied and subsequently a lower level of remuneration of labour, the labour costs in trawl fisheries are lower than in the European countries and account for only between 34% and 40% of total operating costs in Argentina and Peru and for as little as 11% in Trinidad as shown in figure 2 below. Different from deep sea trawlers of European countries, running costs are the most important cost component and account for between 40% and 62% of the total operating costs of deep sea trawlers in Argentina and Peru.

When comparing the two South American countries i.e. Peru and Argentina, the comparatively low vessel costs in Peru because of low expenditure for repair and maintenance are interesting to note as well as the comparatively high running costs of trawlers in Peru, where fuel costs account for up to 55% of total operating costs and up to 47% of total earnings.[13]

In Trinidad and Tobago like in other developing countries, running costs are the most important element of the operating costs with 58% and vessel costs are the second important cost component of the operating costs with 31%.

The same trend as in the case of Trinidad and Tobago, Argentina and Peru can be observed regarding trawlers in the developing countries studied in South, South East and East Asia i.e. India, Thailand and the Peoples Republic of China. Figure 3 below shows that with the exception of two types of Chinese vessels, labour costs only amount to somewhere between 16% and 30% of the operating costs of deep-sea trawlers while running costs are the most important cost component and among the running costs, the cost of fuel is highest. Generally, vessel costs are of minor importance, in most cases accounting for less than 20%.

Two of the three types of Chinese vessels show a little different picture i.e. the pair trawlers and the stow netters, while the results of the 26 m deep sea

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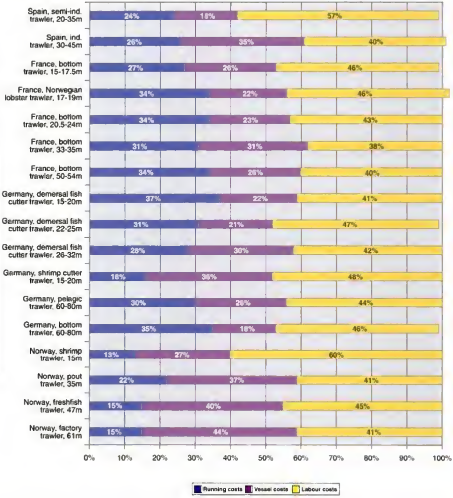
[12] Labour costs include wages and other labour charges such as insurance and employers' contributions to pension funds. Running costs include fuel, lubricants, the cost of selling fish, harbour dues, the cost of bait, salt, ice, packing materials and of food and supplies for the crew. Vessel costs include vessel and gear repair and maintenance expenses and vessel insurance.

[13] See also ANNEX I.

FIGURE 1
Operating costs of deep-sea trawlers in Europe



trawlers correspond to a large extent to the situation in Thailand and India. The 30.5 m steel hull stow netters[14] show an extremely high share of vessel costs (they account for 64% of total operating costs) because of very high expenditure for the particular type of fishing gear operated by the vessels i.e. stow nets and its repair and maintenance (see ANNEX I). The operations of the 25 to 28 m pair trawlers are very labour-intensive with labour costs accounting for 43% of total operating costs. This is directly

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[14] The stow net is actually not a trawl net but a fixed bagnet, a passive gear, even though its shape and design is similar to that of a trawl net.

FIGURE 2
Operating costs of deep-sea trawlers in South America and the Caribbean

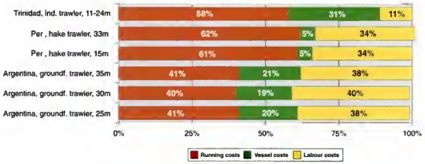
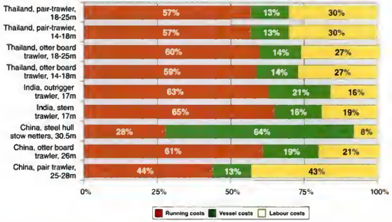


FIGURE 3
Operating costs of trawlers and stow netters in Asia

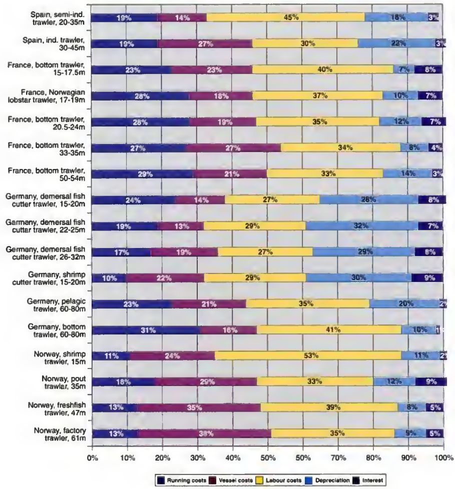


related to the larger crew required for pair trawling operations.

Total costs

When taking into consideration the costs of operation, which lead to the gross cash flow, vessel costs only include expenses for repair, maintenance, etc., but no costs of investment (depreciation and interest), which are closely related to the value of the vessel active in a particular fishery. If these cost components, which are only calculated and not part of the actual cash flow are also considered, a different picture is shown in some cases with regard to the ranking of cost components as shown in figure 4 below.

FIGURE 4
Total costs of deep-sea trawlers - EUROPE



In the majority of fleet segments studied in Norway, Germany, France and Spain, vessel costs, together with depreciation and interest, become the most important cost component followed by labour costs. This trend is more pronounced in Norway and Germany than in France and Spain.

It is interesting to note that costs of depreciation and interest are particularly high in Germany and here again particularly high in the case of the four types of cutter trawlers, which have been included in the study. The reason for the high costs of depreciation is the high costs of fishing vessel construction in

Germany as the cost of depreciation directly depends on the replacement costs. The high cost of interest is related to the relatively high actual value of the German cutter trawler fleet as the vessels are comparatively old but have recently been updated and refitted with new equipment.

As already in the case of operating costs, a different picture emerges for the developing countries studied South America and the Caribbean countries i.e. Argentina, Peru and Trinidad. As shown in figure 5 below, vessel costs continue to play a minor role even when taking into account all costs of investment i.e.

FIGURE 5
Total costs of deep-sea trawlers in South America and the Caribbean

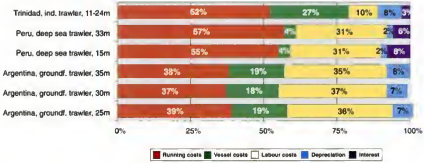
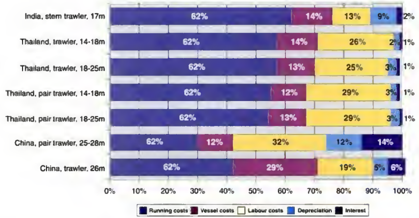


FIGURE 6
Total costs of deep-sea trawlers – ASIA



the cost of depreciation and the cost of interest. Running costs remain the major cost component of total costs, followed by labour costs.

The reason for the differences in the total cost structure between trawlers in developed European countries and developing countries of South America and the Caribbean is that the cost of fishing vessel construction and thus the cost of vessel replacement and depreciation are lower in developing countries, among other things, because of the lower cost of labour. The cost of interest is also lower in some cases as fishing vessels in developing countries are generally older and in many cases the actual value of many vessels is negligible as the vessels have already been fully written off.

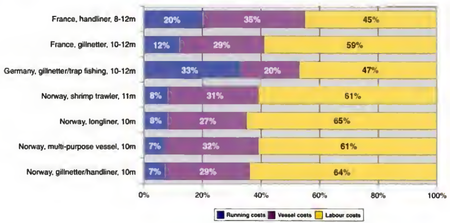
The trend observed above is even more pronounced when looking at the total cost structure of deep-sea trawlers in developing countries of Asia shown in figure 6 above. Running costs remain the most important single cost element even when compared to vessel costs, depreciation and the cost of interest combined. The only exception is the 25 –28 m pair trawlers in China where vessel costs combined with depreciation and interest become slightly more important than running costs. This is the case because of the higher cost of investment in pair trawling as compared to single boat trawling and to the related higher actual values and replacement costs of the vessels involved in the fishing operation.

Cost structure of small-scale fishing vessels

In this section, the cost structure of small-scale fishing vessels with a length up to 12 meter operating various types of fishing gear is compared. Similarly, as in the comparison of the fleet segments of trawl fisheries, the different cost components are related to the operating costs as well as to the total costs, which include deprecia-tion and interest.

As shown in figure 7 below and as it has also been the case in the European deep sea trawl fisheries, labour costs – amounting from 45 to 64% - account for the major share of operating costs in the European small-scale fisheries studied i.e. in Norway, Germany and France. Vessel costs are the second highest cost component ranging from 20 to 35%. Running costs ranging from 7% to 20%, except for German coastal vessels, play a minor role mainly caused by lower fuel expenses. The importance of labour costs compared to vessel costs and running costs, is even higher than in deep-sea trawl fisheries.

FIGURE 7
Operating costs of small-scale fishing vessels - EUROPE



When adding the costs of investment i.e. depreciation and interest to vessel costs, vessel costs gain considerable importance as shown in figure 8 below. Vessel costs and depreciation and interest combined range from 23% to 51% of the total costs.

This finding shows that European small-scale fisheries are relatively capital intensive and that capital is substituting expensive labour. This trend is more pronounced in the case of the German and French vessels and less pronounced in the case of the Norwegian vessels.

Compared to the European small-scale fishing vessel, the cost structure of Senegalese small-scale fishing vessels shows some differences as shown in figure 9 below. While, as in the case of European countries, labour costs are the most important cost element of the operating costs, their share is significantly higher than in the developed European countries included in the study. This supports the earlier finding that small-scale fisheries in developing countries is more labour intensive than in developed countries. Different from the European countries studied, vessel costs is the least important element of operating costs due to low costs of vessel maintenance and repair.

When considering the cost of depreciation and interest, these costs are less important in Senegal - a developing country - compared to the European countries as less capital is combined with the cost of depreciation and interest only range between 7% (in case of the handliner) and 21% (in case of two canoe purse seining) of the total costs. In the case of the European vessels studied, the range was much higher i.e. 23% to 51%.

In the case of small-scale fishing vessels in the Caribbean, a different picture from the one in Senegal emerges. Figure 11 below shows that only in the case of the two types of Barbados flying fish fishing boats using gillnets, dip nets, handlines and fish aggregating devices, do labour costs rank as highest cost component, followed by running costs and vessel costs. In all other cases i.e. four types of boats fishing for lobster and high value bottom species in Antigua and Barbuda and artisanal shrimp trawlers in Trinidad, running costs are the most important cost component as it was already the case with deep sea trawlers operating in developing countries.

In case of the three traditional lobster boats in Antigua and Barbuda, labour costs are even the least important cost component, while in the case of larger lobster

FIGURE 8
Total costs of small-scale fishing vessels - EUROPE

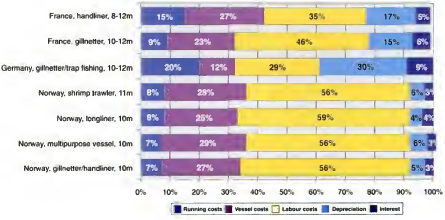


FIGURE 9
Operatings costs of small-scale fishing vessels - SENEGAL

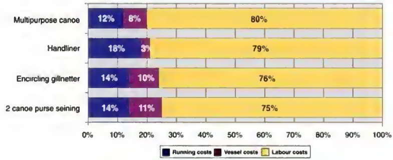
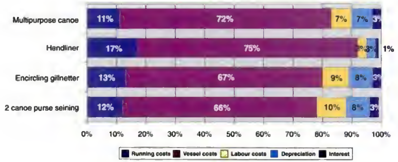


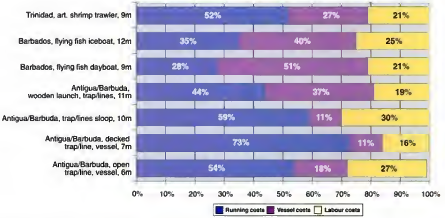
FIGURE 10
Total costs of small-scale fishing vessels-SENEGAL



boats in Antigua and Barbuda and artisanal shrimp trawlers in Trinidad, labour costs are the second highest cost component, followed by vessel costs.

Taking into account the cost of depreciation and interest, the cost structure of small-scale fishing vessels in the Caribbean resembles more the situation found in Europe than the one in Senegal. The vessel costs combined with depreciation and interest range between 24% and 48%, which is close to the situation found in Europe and indicates only a slightly lower level of capital investment. In the case of the two types of boats catch-

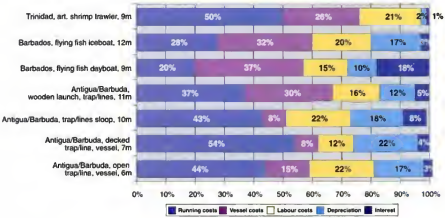
FIGURE 11
Operating costs of small-scale fishing vessels - CARIBBEAN



ing flying fish in Barbados and the sloop catching lobsters and bottom fish in Antigua and Barbuda, vessel costs together with depreciation and interest even account for the highest share of total expenses.

Different from vessels in Europe though, running costs rank second and labour costs are the least important component, both of operating and total expenses.

FIGURE 12
Total costs of small-scale fishing vessels in the Caribbean



When looking at the cost structure of small-scale fishing vessels in South and Southeast Asia, labour costs are the most important component of the costs of operation of four of the six types of vessels shown in figure 13 below. The situation is thus similar to small-scale fishing vessels in Europe and in Senegal. In the case of the Indian log raft operating trammel nets and of the Thai push netter, running costs exceed labour costs. As in the case of the most Caribbean and Senegalese vessels and different from European small-scale fishing vessels, running costs rank second and vessel costs rank third.

Considering the cost of depreciation and interest, figure 14 below shows that vessel costs together with the cost of depreciation and interest range between 15% and 46%, which is more similar to the situation found in the Caribbean and Europe than in Senegal.

However, in no case do vessel costs combined with depreciation and interest account for the highest share of total expenses, as it has been the case with some categories of vessels in Europe and in the Caribbean.

FIGURE 13
Operating costs of small-scale fishing vessels in ASIA

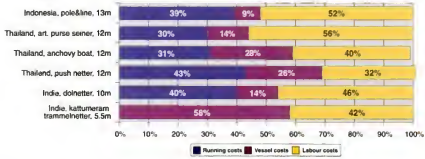
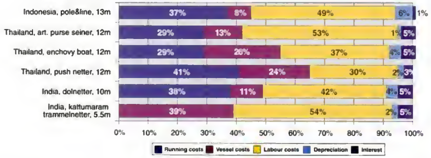


FIGURE 14
Total costs of small-scale fishing vessels in ASIA



In three of the six cases i.e. the Thai push netters and anchovy boats and the Indian kattumaram do vessel costs together with depreciation and interest rank second while in the other three cases they are the least important cost components. This again indicates a relatively low level of capital investment.

Cost structure of tuna vessels

In this section, the cost structure of different types of tuna vessels is compared. Three fishing methods are used by the vessels, which have been covered by the study i.e. pole and line fishing (in Indonesia and Spain), longlining (in India and Indonesia) and purse seining (in Spain). As figure 15 below shows, each of the fishing method has a different cost structure.

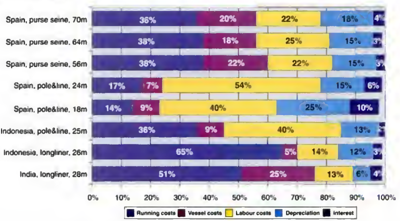
In the case of the Indian and Indonesian longline vessels covered by the study, running costs and particularly the cost of fuel are by far the most important cost component in longline fishing. As can be seen from the cost structure of the Indian and Indonesian longliners, running costs account for 51% and 65% respectively of the total costs, including the cost of depreciation and interest of these types of fishing vessels. In the case of the Indian and Indonesian longline vessels, running costs are even higher than vessel costs and the costs of depreciation and interest combined. The share of labour costs of the total costs of tuna longlining is very similar in India and Indonesia and labour costs only account for 13% and 14% respectively of the total costs.

As far as differences between the two countries are concerned it can be observed that while on the one hand, running costs are lower in India, vessel costs account for 25% of the total costs while they only account for 5% of the total cost in Indonesia. The cost of depreciation is also much higher in Indonesia and could be related to the higher replacement value of longline vessels in Indonesia as compared to India.

The three classes of Spanish tuna purse seine vessels included in the study show a rather similar cost structure with vessel costs accounting for between 36% and 38% of the total costs, labour costs between 22% and 25% and vessel costs between 18% and 22%. If the cost of depreciation and interest is added to the vessel costs, this cost component is slightly higher than the running costs of the purse seine vessels.

The three types of pole and line vessel included in the study i.e. two types of Spanish vessels and one type of Indonesian pole and line vessels show a very characteristic cost structure, which is dominated by labour costs. These account for between 40% and 54% of the total costs of pole and line fishing, while vessel costs only

FIGURE 15
Total costs of tuna vessels



account for between 7% and 9%. When comparing the 25m Indonesian pole and line vessel with the similar size class Spanish vessel, it is noticeable that the Indonesian vessel has a significant lower share of labour cost and running costs account for a relatively higher share of total costs. These differences are primarily related to a lower level of crew remuneration in Indonesia as a developing country as compared to Spain.

2.4 Recent trends and changes in fishing technology, practices and level of exploitation of fisheries resources

The following chapter highlights trends and changes in fishing technology, practices and level of exploitation of fisheries resources, which occurred since the previous cost and earnings studies were carried out between 1995 and 1997. Furthermore, the chapter highlights important features of the marine fisheries of the countries included in the study.

CHINA

Since the previous cost and earnings study was carried out in China during 1995-1997, important changes have taken place. At the time of the previous study, 87% of the total catch originated from the East China Sea. In 2000, when the recent study was carried out, only 37% of the total marine catch came from the East China Sea. Even though less important now, the East China Sea is still China's most important fishing area, especially the coastal waters of Jiangsu, Zhejiang, Fujian Province and of the City of Shanghaï. Most fishing grounds are between 100 and 200 meters deep.

The South China Sea, which was hardly fished by the fleets from China previously, is now being intensively exploited. The South China Sea has become the second most important fishing area, which accounts for 23% of the total Chinese catch. This diversification of fishing effort from the East China Sea to the South China Sea has mainly been caused by over-fishing in the East China Sea and by corresponding restrictions of fishing effort. Other important fishing areas are the Yellow and Bohai Seas, which contribute 34% to the total marine fish production of China. 6% of the total catch comes from deep sea and distant waters.

The study in China focussed on the fishing fleets operating in the East China Sea. These include 12 633 steel fishing vessels, of which 890 have more than 600 HP. There are more than 80 000 smaller wooden fishing vessels, more than half of which have less than 15 HP. There are also 13 854 non-motorised fishing vessels fishing in the East China Sea. The size of the fishing fleet greatly increased over the last few years. Particularly the number of steel vessels of more than 600 HP increeased by 77% since 1997.

Regarding the type of fishing technology used in the East China Sea, it is observed that more than half of the catch is taken by trawling. Due to overfishing, however, the catch per unit of effort of trawlers fishing in the East China Sea is steadily declining. This is particular true for bottom pair trawling.

Set net fishing is also of great importance and accounts for 18% of the total catch. Its importance is declining though. At the time of the previous study, it still accounted for one fourth of the total catch. Likewise, the importance of purse seining, which accounted for about one fifth of the total catch at the time of the previous study, has been continuously declining since the mid-eighties and in 2000 only accounted for 5% of the total catch of the East China Sea.

While the importance of set net fishing and purse seining is declining, gillnet fishing is becoming more popular. A large range of gillnets are now being used for various species and accounts for 13% of the total catch. This fishing method became popular at the beginning of the eighties and compared to 1995, an increase of 80% in the number of gillnets is observed.

Since 1999, the Chinese Government has intensified efforts to control and limit the expansion of fishing capacity in order to protect fisheries resources. For this purpose, a "zero growth" policy for marine capture fisheries has been adopted, which includes the following management measures and regulations:

- An increasing number of fishing vessels is controlled through licence systems.
- Fishing areas have been demarcated and certain areas are closed to fishing when necessary.
- MSYs and MEYs have been established for important species such as long hairtail, yellow croaker, triggerfish etc.
- Closed seasons have been established. Since 1997, trawling is prohibited for two months each year in the East China Sea. This measure made many

companies move their fishing vessels to other fishing areas especially to the South China Sea.

KOREA

When compared to the previous study carried out in the Republic of Korea, the total number of Korean fishing vessels declined from 3357 to 3002. The main reason for the decline is the overexploitation of many fisheries resources and fleet overcapacity, which resulted in a lower profitability of fishing vessels. The types of vessels the numbers of which declined include offshore stow netters, large purse seiners, anchovy mid-water trawlers, large bottom and mid-water pair trawlers, large bottom and mid-water otterboard trawlers, Danish seiners and Eastern Sea bottom trawlers. An increase in the number of vessels can be observed, however, in the case of offshore squid jigging vessels. There has not been any major change in fishing grounds since the last study was carried out.

The fishing areas are:

- offshore stow netting: Yellow Sea and East China Sea,
- coastal stow netting: near the shore of Yellow Sea,
- offshore jigging: mainly East Sea, partially Yellow Sea in about 400 n mi from harbour,
- large purse seining: all along the coast of China, from coastal waters to 300 n mi from shore, including East China Sea,
- anchovy mid-water trawling: from coastal waters up to 100 n mi from shore,
- large bottom/mid-water trawling: around Cheju Island (Southern Sea) and East China Sea, within 200 n mi from shore,
- large bottom/mid-water pair trawling: same area as above and additional areas in Yellow Sea and East China Sea, fishing distance up to 400 n mi from shore,
- Danish seining: large vessels operate around Cheju Island, middle and south of East China Sea less than 250 n mi from harbour; middle size vessels operate in southern part of Yellow Sea, western part of Southern Sea less than 100 n mi from harbour and coastal part of Eastern Sea,
- Eastern Sea bottom trawling: coastal part of Eastern Sea less than 50 n mi from harbour.

Regarding species composition, the only major change compared to the previous study is that squid has overtaken mackerel as most important species in terms of volume of catch because of the increase of the number of squid jiggers and the decline of the number of other types of fishing vessels.

As far as plans for future development are concerned, there is little potential for development of new fishing areas, neither in coastal areas nor offshore. Almost all types of fishing gears, equipment and fishing vessels in use now have been operated in the Republic of Korea since the 1970s. Almost all existing resources are fully exploited.

The Korean Government, through the Law of the Fishery Industry, actively controls fishing effort. Recently, the Ministry has stopped issuing new fishing licences in order to conserve fisheries resources.

THAILAND

The Thai fishing fleet has expanded significantly over the past three decades. This expansion has meant more fishing vessels and of a greater size and catching capacity. The Thai fishing fleet includes many small boats, as 50% of the fishing vessels are less than 14m in length. This includes many small otterboard trawlers operating in coastal waters. Almost three quarters of the Thai fishing fleet are small trawlers. In terms of volume of catch, the fleet of small to medium size purse seiners is also very important

Because of fleet expansion, there is a large number of new fishing units of less than 5 years, in particular trawlers of 14 - 18 m in length used for pair trawling and also purse seiners of 18 - 25 m in length. Other small vessels were introduced for push netting in very shallow waters but this method has recently been banned on many fishing grounds.

Fishing grounds within Thailand's EEZ are located in the Gulf of Thailand and in the Andaman Sea. The cost and earnings study in Thailand was confined to fishing vessels operating in the Gulf of Thailand. The Thai EEZ in the Gulf of Thailand covers an area of approximately 252 000 km2. The Gulf is relatively shallow with a mean depth of 45 m. and a maximum depth of 80 m.

The fishermen land their catch at 11 fishing ports and landing sites, 8 in the Gulf of Thailand and 3 in the Andaman Sea, which are administered by the Fish Marketing Organisation (FMO), and at 657 private landings sites scattered along the coast, 362 in the Gulf of Thailand and 295 in the Andaman Sea. The main species landed, in terms of volume, are sardine and anchovy. All pelagic fish species together account for 37% of the total catch. So called "trashfish" accounts for a share as high as 37%. Over the last ten years, the proportion of pelagic fish of the total catch has greatly increased. The catch of sardines and anchovy has almost doubled. The quantities of so called "trashfish" though have continuously declined, which indicates that fish which was previously used for fish meal or as animal feed is now being used for direct human consumption.

As far as fisheries legislation is concerned, there are three sets of laws, which regulate aquatic resource management and development of marine fisheries in Thailand: the Fisheries Act of B.E 2490 (1947), the Thai Vessel Act of B.E 2481 (1938) and the Law on Navigation in Thai Waters of B.E 2456 (1913). Of these laws, the Fisheries Act of B.E 2490 is most directly concerned with aquatic and fisheries resource management and regulates:

1. sizes and types of fishing gears that are permitted in Thai fisheries
2. mesh sizes for purse seining and gillnetting
3. prohibition of the use of certain type of fishing gears in certain areas in order to prevent degradation of the coastal environment through intensive use of poorly selective fishing gear such as push nets
4. prohibition of the use of intoxicants or toxic substances, electricity and explosives for fishing
5. prohibition on fishing of certain rare species.
6. prohibition of the use of certain types of fishing gears in spawning and nursery seasons of commercially important species.
7. limiting new entry of trawlers and ceasing to grant new trawl licenses.

While it is generally accepted that fisheries resources in coastal waters have been fully or overexploited and fishing fleets and effort in the Gulf of Thailand needs to be reduced, new fisheries resources in offshore waters both in the Gulf of Thailand and the Andaman Sea have recently been identified. For the exploitation of most of these resources, agreements with neighbouring countries and the establishment of joint ventures are necessary. This also applies to the development of tuna fishing in the Indian Ocean to support the canning industries, which require substancial quantities of raw materials for processing.

INDIA

When compared to the previous cost and earnings study carried out in India, the number of fishing vessels has increased further in all categories of vessels. Most fishing is carried out within the 100 m depth zone. In inshore waters, up to 30 m depth, traditional boats, both non-motorised and motorised, mainly powered by outboard engines, operate. These boats include traditional wooden displacement craft, log rafts locally called kattumarams as well as FRP boats. Over a period of five years, the number of traditional non-motorised boats increased from 146 285 to 159 481 and the number of motorised boats from 25 467 to 31 826.

Further offshore but sometimes on the same fishing grounds, mechanised vessel operate. These include many gill-netters, in certain areas purse seiners and almost everywhere small or medium size trawlers. The number of these mechanised boats increased from 34 848 to 46 918. There are both shrimp and shrimp-cum-fish trawlers but also shrimp trawlers catch and keep large quantities of fish. Medium size shrimp trawlers operate further offshore on the North East Coast with Visakhapatnam as their base. They also catch and keep high priced fish.

Traditional boats land their catches at larger fishing villages, which are connected to major roads. Mechanised fishing boats land their catch in ports and fish landing centres. Deep-sea fishing is mostly confined to the North East Coast with the base at Visakhapatnam. Purse seiners operate mainly off the West and South West Coast.

In 1997/98, 2.95 million tons of fish were landed. Prawns were the single most important species accounting for 15% of the total catch. 70 percent of fish catches were landed by mechanised vessels and 30 percent by non-mechanised ones.

Regarding the level of exploitation of marine fisheries resources, it is assumed that in inshore waters, most of the commercially important fish species are overexploited. This includes Bombay duck, mackerel and oil sardine. Other commercially important species such as seer fish, crabs and lobsters have reached maximum levels of exploitation. It is assumed, however, that anchovies, some other clupeids, tunas, bill fishes, perches, pomfrets and sciaenids could still tolerate a higher fishing effort, especially beyond the 50 m depth zone, and that about 700 multi-purpose so called new generation fishing vessels of about 18 m length could be introduced for that purpose.

Under the National Marine Fishing Regulation Act, fisheries legislation and regulation are the responsibility of State Governments. As a result, fisheries regulations differ from place to place. The operation of foreign fishing vessels in India's EEZ is regulated under the provisions of the Maritime Zones of India Act of 1981.

From 1991 onwards, a policy was introduced, which promoted the leasing of foreign fishing vessels for operation in the Indian EEZ, joint ventures between Indian and foreign companies in deep sea fishing, fish export and processing and test fishing through engagement of foreign fishing vessels. As a result, the number of foreign fishing vessels exploiting the Indian EEZ under various arrangements increased considerably. Eventually, this led to conflicts with traditional fishermen.

Partly as a consequence of these conflicts and with a view to formulate a policy for a sustainable use of marine fisheries resources, the so-called Murari Committee was established in 1995. With a view to conserve fisheries resources and to protect traditional fishermen, the committee recommended the cancellation of fishing permits of joint ventures, charters and lease arrangements as well as not to renew or grant new licenses to foreign vessels for fishing in India's EEZ. The committee also recommended modernisation of traditional fishing vessels and introduction of medium size multi-purpose fishing vessels.

Other important recommendations concerned the development of a high sea fishery through a new deep sea fishing policy; the strengthening of surveillance and control of fishing zone restrictions as well as assistance to traditional fishermen through training and upgrading of equipment.

The most important recommendations, which were incorporated in the Ninth Five-Year Development Plan, include:

- Upgrading of fishing capabilities of existing mechanised vessels (below 20 m LOA) by providing them with navigational aids, GPS, fish finders, communication equipment and increasing their fish hold capacity.
- Introduction of intermediate range of fishing vessels (15-19 m LOA) with capacity to fish in depths of 70 - 150 m. These vessels should be combination vessels capable of trawling, longlining and purse seining.
- Diversification of trawlers to longlining, purse seining and squid jigging.
- Financial for procurement of patrol boats.
- Motorization of traditional craft with outboard or inboard motors and provision of fishing gear.
- Introduction of new hull materials such as FRP and ferrocement for fishing vessels.
- Central excise duty exemption on HSD oil supplied to vessels of below 20 m LOA.

INDONESIA

Over the last decade, marine fisheries in Indonesia expanded considerably. The number of fishermen in Indonesia increased from 1.4 million in 1988 to 2.1 million in 1997, which is equivalent to an average annual increase 4.5%. Half of the fishermen are full-time fishermen. Over the period from 1989 to 1998, marine capture fisheries output increased at an average rate of 5.6% per year. 40% of marine fisheries production consists of small pelagics and 20% of large pelagic fish. The major fish species landed were scads (128 459 tons), Indian mackerels (204 763 tons), eastern little tuna (236 673 tons), fringe-scale sardinella (174 691 tons), skipjack (227 068 tons), anchovies (166 808 tons), trevallies (128 459 tons) and Indian oil sardinella (153 965 tons).

In 1997, the total number of marine fishing boats operating in Indonesia was about 402 000. The small-scale fleet consists of non-powered boats and boats equipped with outboard and inboard engines of less than 5 GT. It accounted for 94% of the total number of fishing boats in 1997. In 1997, about half of the total marine catch was caught by purse seines. Other important fishing gears are surrounding or ring nets without purse line (lampara net/payang), drift and set gillnets and pole and line used to catch skipjack. The cost and earnings study in Indonesia covered purse seiners, skipjack pole and liners, tuna longliners and gillnetters.

The Indonesian purse seiners included in the study were originally ring netters operating with FADs locally called rumpon (lure). Most of them, i.e. 3084 units in 1998, have their fishing bases on the northern coast of Java. They target small pelagic fish, such as scads, mackerels, sardinella, trevallies, Spanish mackerel, anchovies and also small tunas and hairtails. Replacement of the traditional payang and lampara nets through purse seines, motorization of boats and extension of duration of fishing trips made it possible to catch more fish.

In 1998, 1515 skipjack pole and liners were operating in Indonesia. Most of them motorised fishing boats of 10 GT and 30 GT, used with fish aggregating devices. 60% of the vessels operate in Maluku and east of Indonesia/ Irian Jaya.

The tuna longliners covered by the study use hundreds of baskets of 5 - 11 hooks being attached to the mainline by 30 m long branchlines, attached to the mainline every 50 - 60 meters. Baits used are scads, mackerels, milkfish and similar species. Smaller longliners normally use monofilament lines. In 1998, 2285 vessels were operated, many of them by fishing companies based in Bali. The longliners mainly fish in the Banda Sea, the Sulawesi Sea and in the Indonesian Exclusive Economic Zone of the Indian Ocean and Pacific Ocean. Fish caught by tuna longliners are mainly yellowfin, big-eye and bluefin tunas and albacore, as well as other large pelagic species such as billfish.

The gillnetters covered by the study are 30 GT boats operating 30 to 60 pieces of driftnets with 10 cm meshsize and 8 meters height. These boats are operated from North Java to catch Spanish mackerel as target species and also Indo-pacific mackerel, little tunas, pomfret, etc.

Most fishing grounds in the western part of Indonesia are fully exploited because of their proximity to major markets and infrastructure located in nearby Java and Sumatra. Fishing grounds in the eastern part of Indonesia are still underexploited except for demersal fish and shrimp in the Arafura Sea. According to the National Commission on Stock Assessment of Marine Fisheries Resources, the resources of demersal and coral fishes are almost fully exploited in many areas, shrimps are already overexploited while there is a rather large potential for large pelagic and some potential for small pelagic species in certain areas.

Indonesia is divided into nine fisheries management zones. In each of the zones there is a co-ordinating forum for the management and utilisation of fisheries resources dealing with the allocation of fishing effort, the issue of fishing licenses and with the evaluation of management measures and controls.

SENEGAL

In 1997, the industrial fishing fleet of Senegal consisted of 281 vessels. Most of the larger vessels are rather old. The average age of ice vessels is 24 years and that of freezer vessels is 21 years. One third of the industrial fleet operates under foreign flags. Almost three quarters of the tuna vessels fly European Union flags. 78% of the industrial vessels are trawlers and exploit demersal resources; the other vessels target tuna.

The artisanal fishing fleet consists of 7 616 canoes with 44 257 fishermen. Compared to the previous study carried out in Senegal, the number of artisanal fishing boats has further increased. 91% of the units are motorised. The main fishing methods are purse seining, encircling gillnetting, handlining and the operation of fixed gillnets, handlines and pots.

Regarding fisheries regulations, pelagic fishing vessels can fish nearer to the coast than vessels exploiting demersal resources. The fishing zone demarcation reflects the configuration of the continental shelf, which is narrow to the North of Cap Verde (Dakar) and larger in the south. For industrial fishing vessels, fishing area restrictions and reserved areas depend on a combination of the tonnage of the vessels, the fishing method, which is used, on whether the boats preserve their catch in ice or freeze it and finally on the type of resources, which are being exploited i.e. demersal or pelagic resources. For artisanal fishing vessels, regulations depend on the fishing method, which is being used.

Since 1987, a law restricts fishing power. Vessels larger than 1500 GT are not allowed. The law also regulates fishing gear essentially through meshsize regulations, the issuance of fishing licences and minimum sizes for fish, which can be caught. In 1998, a new law introduced a "Code for Marine Fisheries". Main changes concern access to fishing grounds and involvement of fishing communities in fisheries management. Industrial vessels have to pay for fishing licences and the construction of artisanal canoes is now controlled and subject to official permit and registration. Multi-annual fisheries management programmes are being prepared and implemented as well as fisheries monitoring plans to ensure the sustainability of marine fisheries in Senegal.

Government plans for future fisheries development focus on offshore fishing, on the replacement of old industrial fishing vessels, on the development of tuna fishing, particularly longlining and on the exploitation of deep sea demersal resources, especially hake. As far as inshore fishing operations are concerned, the emphasis is on moving pelagic fishing activities further offshore, on reducing fishing effort on demersal resources and on improved control and monitoring.

NORWAY

In the Norwegian fishing fleet, 50% of the fishing vessels are less than 8m long and more than a third are open vessels. Since 1970, the number of decked vessels stayed quite stable around 8.500. The average age of Norwegian fishing vessels is rather high, especially the age of very small vessels. Only a small part of the vessels i.e.18% are used throughout the year. Strict regulations are in place to limit the total catch to a level, which is considered a reasonable level for sustainable fisheries.

Three main fishing areas are distinguished:

Barents Sea. Demersal fish such as cod, saithe, haddock are exploited by large fresh fish and factory trawlers Shrimp are caught by large specialised freezer trawlers of which 24 units are more than 50 m long. Pelagic fish such as capelin and herring are caught by purse-seiners and pelagic trawlers. In 2000, there were 37 large purse seiners with 1,000 GT and more capacity of which, however, not all are permanently fishing in the Barents Sea.

Norwegian Sea and coastal areas. Demersal fish such as cod, saithe and other demersal species are exploited by a coastal fleet of 575 vessels, 13 m long and above, using traditional gears such as gillnets, longlines, handlines and Danish seines and operate throughout the year. Saithe is also exploited by small purse seiners in a seasonal fishery. Non TAC-restricted species such as ling, blue ling and tusk are exploited by longliners operating offshore. There is also exploitation of shrimp by small fresh fish trawlers of between 20 to 30 m length. Pelagic resources are seasonally exploited such as spawning herring by purse-seiners and pelagic trawlers in spring.

North Sea and Skagerrak. The main fisheries are for pelagic fish such as herring, mackerel and sprat caught by purse seiners and for species that are caught by bottom trawlers for reduction to fish meal and fish oil. These include Norway pout, blue whiting, and sandeel. Shrimp is also caught by specialised shrimp trawlers.

While most catches are taken inside the Norwegian EEZ, 80% of stocks are shared with neighbouring countries such Russia, Iceland, Faeroe Islands and the European Union. Pelagic species account for more than three quarters of the volume of the total catch but only for one third of its value. Shrimp constitutes only 2.4% of the volume of the total catch but 10% of its value.

GERMANY

In 1998, the German fishing fleet consisted of 2305 vessels with a capacity of 67 697 GT in tonnage and 159 737 kW in engine power. The German fishing fleet can be divided into three main fleet segments i.e. the coastal fishery, the cutter deep-sea fishery and the large-scale trawler deep-sea fishery. 1 803 vessels are involved in coastal fishing in the Baltic and North Sea for groundfish, herring and flatfish. 1 777 of these boats are less than 12 m in length. 446 vessels between 15 and 32 m of length and 40 to 200 GT capacity, most of them beam trawlers, are involved in the cutter deep-sea fishery. These vessels operate in North Sea and Baltic Sea and target shrimp, flatfish and groundfish. The large-scale trawler deep-sea fleet segment consists of 4 pelagic and 8 bottom trawlers fishing in third countries, EU-, NAFO- and NEAFAC waters. The pelagic trawlers have a capacity of 4 566 GT and 2 937 kW while the bottom trawlers have a capacity of 2 180 GT and 2 602 kW.

The German fishing vessels are rather old. 80% of the coastal vessels of more than 12 m length are more than 25 years old. 60% of the cutter trawlers are more than 25 years old.

The North Sea is the main fishing area for German vessels and accounts for 61% of the total catch. Over the last few years, fishing operations have increased in the North Sea, off Greenland and in the Southeast Atlantic. At the same time, fishing effort was reduced elsewhere. In terms of quantity, small pelagics, in particular herring and horse mackerel, are the most important species caught. 71% of the catch of the offshore fleet consists of small pelagics.

Regarding landing areas, about 20% of the catch of the coastal and cutter fleets is landed abroad, mainly in

Denmark and Holland while the deep sea fleet lands 86% of its catch outside of Germany.

The fish stocks, which are exploited by the German fleet in North European waters, are managed within the framework of the European Common Fisheries Policy (CFP) and International Conventions. In Germany, national quotas are broken down by Government regulations by vessel type and species. Specific quotas are allocated through the "Deutscher Fischerei Verband". Some are allocated on a "first come first served" basis. Others are directly allocated to deep-sea vessels. Only when fishing opportunities are scarce are quotas shared through Producers Organisations (PO).

According to the EU Multi-annual Guidance Programme (MAGP) for the reduction of fleet capacity, gross tonnage was to be reduced in Germany by 16% and engine power by 5% over the period 1.1.97 to 31.12.01. These targets were already achieved by 1.1.98. As the German fishing fleet is rather old, it is felt that there is a need to build new vessels and modernise others in order to have a competitive fleet without increasing fishing effort. In addition to EU policy and regulations, there are national regulations, which include both federal regulations and "Laender" regulations.

With regard to the level of exploitation of fish stocks targeted by German fishing fleets, stocks of North Sea and Atlanto-scanian herring are considered in a good condition. The same applies to stocks of tuna, North Atlantic redfishes, saithe and mackerel. For North Sea cod, a good chance of recovery is predicted. The stocks of Alaska pollack, cod and halibut in different areas of the North Atlantic, cod in the Baltic, all stocks of hake, and plaice in the North Sea are declining, however.

FRANCE

70% of the French fishing vessels i.e. 4 198 units operate off the Northern and Western coasts of the country and the rest i.e. 1776 vessels in the Mediterranean Sea. Vessels fishing in the Mediterranean Sea are smaller vessels most of them less than 12 m long. All vessels larger than 40 m are operating off the Northern and Western coasts of France.

Since 1983, the French fishing fleets operating from the Northern and Western coasts have been continuously reduced according to the EU Multi-annual Guidance Programmes to adapt fleet capacity and fishing effort to sustainable levels of exploitation of fisheries resources. Since 1990, the number of fishing vessels has been reduced by 31%. Over the last 3-4 years only, the number of fishing boats was reduced by 14% while vessel capacity in terms of engine power was reduced over the same period by 8%.

Regarding the age structure of the French fishing fleet it can be observed that the average age of French fishing vessels has been increasing over the years. The proportion of vessels older than 15 years for example increased from 54% in 1995 to 64% in 1999. According to the European Multi-annual Guidance Programmes (MAGP), no authorisation can be given to build new boats as long as targets are not reached except for the replacement of old units and at the rate of withdrawal of 130 kW for introduction of 100 kW. There seems to be a need for replacement of fishing units over the next decade and the fishing industry is now replacing old boats by fewer but more efficient new units.

30% of fish landed in France is caught in French waters of the European EEZ i.e. in the English Channel, the Atlantic Ocean and in the Mediterranean Sea. Small-scale fishing accounts for 80% of these landings. 50% of fish landed in France is caught in other parts of the European EEZ i.e. West Cornwall, East and West Ireland and Western Scotland. Semi-industrial and industrial fishing accounts for 80 percent of these landings. The rest of fish landings comes from international waters or from third countries' EEZ and is caught under bi-lateral agreements involving industrial fishing vessels especially tuna seiners.

Over the last few years, all categories of vessels of less than 20 m length have increased their catch efficiency by 10 to 20%. Regarding the main species caught, fish accounted for 55% of the total catch and small pelagics accounted for almost 40% of the total fish catch.

As in the case of other EU countries, the Common European Fishery Policy applies to French fisheries.

This includes:

- Conservation of fisheries resources through technical measures such as determination of minimum sizes of fish, dimensions and sizes of fishing gear, demarcation/restriction of fishing zones, determination of Total Allowable Catch (TAC) for the main species fished. From 1999 to 2000, the TAC of 14 out of the 17 main species was reduced with drastic cuts for overexploited stocks of gadidae.

- Adaptation of fishing effort to available fisheries resources through reduction of fishing capacity in terms of engine power through Multi- annual Guidance Programmes (MAGP); licensing of fishing boats.

- Market stabilisation and control through fixing of withdrawal prices.

The potential for future development of the French fleet focusses on gaining access to new fishing areas through bi-lateral agreements with third countries, exploitation of so far under-exploited deep-sea resources and the replacement of old fishing units through more efficient new units.

SPAIN

In Spain, fishing is a particularly important economic and social activity. In 1997, more than 18.000 fishing boats were registered, which employed 68.000 fishermen. In 1998, the fleet of trawlers, almost entirely bottom trawlers, numbered 2 569 units. Large Spanish freezer trawlers are operating in all parts of the Atlantic Ocean. There are more than thousand fishing boats, using surrounding nets for small pelagic fish species. In addition, there are more than 5 000 gill-netters, almost 2 000 handliners, 1 500 longliners and more than 800 pole and line vessels as well as a fleet of purse seiners.

As far as the age structure of the Spanish fishing fleet is concerned, the proportion of old vessels is very high. 64% of the Spanish fishing fleet is more than 20 years old. According to vessels categories, 63% of the semi-industrial trawlers are more than 20 years old and 43% of the pole and liners. However, over the last 5 years, a number of new vessels were introduced, particularly semi–industrial trawlers, industrial trawlers and pole and line vessels.

The third and fourth EU Multi-annual Guidance Programmes for the period 1992 to 1999 required from Spain the withdrawal of up to 900 vessels of 119 000 GT and 238 000 kW. Spain fulfilled her requirement. Between 1996 and 1998 alone, the number of Spanish fishing vessels decreased by about 6% and the total engine power by almost 20%. This reduction was mainly achieved through a reduction in the number of trawlers by almost 30%. As Spain has fulfilled her commitments under the MAGP, the country is now going ahead with a fleet modernisation and renewal programme.

The future development of Spanish marine fisheries is seen as depending on the access to new fishing areas through fishing agreements with Canada, South American countries such as Argentina, North African countries such as Morocco and Mauritania as well as with other countries in Africa and countries bordering the Indian Ocean. Other opportunities are seen in the exploitation of new resources including fisheries resources in remote areas of the Northwest Atlantic, the Northeast Atlantic, the Southwest Atlantic, in deep waters off Angola, in the Southeast Atlantic, the Southwest Indian Ocean and in Antarctic waters.

TRINIDAD & TOBAGO

In 1998, the trawler fleet of Trinidad & Tobago covered by the study consisted of 19 so-called industrial vessels, 10 semi-industrial trawlers and 84 artisanal trawlers. Artisanal and semi-industrial trawlers make day trips and tow a single trawl net while industrial trawlers are outrigger trawlers, which stay at sea for about two weeks and operate two trawl nets. Semi-industrial trawlers are 9-12 m long and have 120-180 hp engines. Industrial trawlers are 11-23 m long and have 270 to 310 hp engines. The trawler fleet of Trinidad & Tobago is relatively old. 83% of the semi-industrial units are 15 to 20 years old and 84% of the industrial trawlers are more than 20 years old.

The main landings of trawlers in Trinidad & Tobago consist of shrimp and by-catch, which can be double in volume as the actual shrimp catch. The main fishing area for all vessels is the Gulf of Paria. The industrial units also fish off the North Coast and in the Columbus channel. Regulations concerning mesh size, dimensions, minimum sizes of fish, prohibited areas, species, fishing seasons are only applied within the 12 n mi territorial sea. Since 1997, there is a fishing agreement with Venezuela but there are problems with its implementation.

As far as the state of the resource is concerned, shrimp has been overfished in the early nineties and the catch per unit of effort declined. Government policy is to limit the fishing effort on shrimp to the 1996 level or below this level. There is no potential for the development of new fishing areas. As a consequence, there are no plans for the expansion or modernisation of the trawler fleet other than the option to diversify trawlers to other fishing methods.

ARGENTINA

In 1998, more than half of Argentinean fishing fleet consisted of trawlers, 368 vessels altogether. About one third of the trawlers were more than 36 m long and 26% between 24 and 36 m long. The second most common types of vessel are gill-netters, 15% of the total, and a third of these are large units, between 36 and 45 m long. In addition, there is a fleet of small purse seiners, less than 18 m long, and a few large longliners of 45 to 60 m in length.

The Argentinean fishing vessels are rather old: More than 40% of the vessels are more than 25 years old. The deep-sea fleet of larger vessels of more than 30 m in length is of more recent construction and only 25% of the vessels are more than 25 years old. In the so-called artisanal fishing fleet with vessels of about 20 m length, 70% of the vessels are more than 25 year old.

The total marine catch of Argentinean fishing vessels is about 1 million tons, of which one third consists of squid, 31% of Argentinean hake and 12% of Patagonian whiphake. After reaching peaks in 1997, landings of most fish species declined. This is particularly true for the two main species i.e. Argentinean hake and squid.

Regarding Argentinean hake, the main target species of trawlers, after reaching a maximum in 1996, the landings dropped by almost half indicating heavy overexploitation of the resource. Strict measures were taken by the Argentinean Government, including the measure taken in June 1999 to ban Argentinean hake fishing by freezer trawlers north of 48°S. Trawlers now target new species and areas, especially squid and Patagonian whiphake, the latter one to substitute Argentinean hake. Compared to 1996, landings of Patagonian whiphake increased tenfold. In accordance with above changes, fishing operations are moving southwards.

In accordance with national fisheries regulations, within the Argentinean EEZ, which extend up to 200 n mi from the shoreline, only vessels with Argentine flags and holding a licence obtained for a maximum of three years are allowed to fish. Since 1992, however, a decree allows the chartering of foreign flag vessels for periods of three years. Argentina and the European Union have signed a fishing agreement for an annual catch up to 250 000 tons during an initial five-year period. Provinces in Argentina have authority to regulate fishing operations in in-shore fisheries up to 3 n mi from shore.

PERU

Peru is one of the major fishing producing countries in the world in terms of volume of catch. In 1999, the total catch was 8.2 million tons. The resources fished, particularly the pelagic ones, are dependent on important hydro-biological factors including the Humbolt and El Niño currents, which is why catches are fluctuating. For example in 1998, only 4.3 million tons were caught. Fluctuations occur especially in the case of small pelagics. In 1998, the landings of small pelagics accounted for 70% of the total landings. Among small pelagic species, anchovies and sardines contribute almost half to the total small pelagic catch but also mackerel and horse mackerel are important species.

The Peruvian fishing fleet is rather old, except for purse seiners fishing for canneries. More than half of these vessels are less than 3 years old.

Fisheries legislation and regulations rule that industrial and semi-industrial vessels have to operate beyond the 5 n mi limit from shore. Minimum sizes for fish being landed are determined as 12 cm for anchovies and 35 cm for hake. Meshsize regulations stipulate a minimum of 13 mm for the bunt of anchovy purse seines and 110 mm for the meshes of codend used for hake fishing. Quotas are fixed every year for small pelagic species and there are closed periods i.e. 173 days in 1998 for both trawlers and purse-seiners. No increase of fishing effort by purse seiners and trawlers is allowed which is why old vessels can only be replaced by new units with exact equal capacity. In hake fisheries, purse seiners and very large trawlers are prohibited.

Chapter 3

The role of utilization and marketing of fishery products

The first two rounds of studies on the techno - economic performance of marine capture fisheries had focussed on the comparison of the cost structure and economic and financial performance of fishing vessels. They did not cover the impact of utilisation of fish catches, value addition and marketing of fishery products on the economic and financial results of fishing operations.

The participants of the inter-regional workshop where the findings of the studies were discussed agreed that utilisation and marketing of catches played a crucial role in the economic and financial performance of fishing units. With a view to identify economically and financially more efficient ways of utilisation and marketing of catches and to provide guidance, particularly to fishery industries in developing countries, on how the economic efficiency of the various types of fishing vessels already covered by the study could be further enhanced, it was suggested that further monitoring and analysis should focus on utilisation of catch and marketing of fishery products.

Working group III of the workshop elaborated specific proposals how this could be studied and the proposals were then endorsed in plenary. The following priority areas for studies were identified by the working group.

1. Studies of costs and benefits of post harvest technologies for

   - Alaska pollock
   - Threadfin bream
   - Anchovy
   - Norway lobster
   - Monkfish / Angler fish /Sole / Hake.
   - Nemipterus / Sciaenids / Ribbonfish.

2. Study of the cost of marketing from the time of landing to retailing, taking into consideration all logistics involved and the entire market chain

3. Costs and benefits of the utilization of by-catch and comparative analysis of its use as animal feed and for human consumption.

4. Comparative cost analysis of processing of fish/filleting of fish on-board vessels and on shore.

5. Study of possible advantages of an intermediary development approach to be adopted for encouraging smaller grading/processing/cold storage units at a number of small landing centers. This would reduce the labour cost and allow better utilization of existing manpower with the respective fishermen.

6. Study of costs and benefits of improving handling of catches on board. This should include the use of refrigerated seawater in some small pelagic fisheries and its impact on and advantages for catch utilisation.

In the light of above recommendations endorsed by the plenary of the workshop, it was also suggested that the work programme of the FAO Fish Utilisation and Marketing Service regarding by-catch utilisation and the use of undervalued resources should be forcefully pursued and work in Asian countries be promoted. INFOFISH should be involved in these activities. A workshop where the results of this work as well as the expansion of the cost and earnings studies of marine fisheries into the post harvest field could be analysed and discussed, should be planned for 2002.

Chapter 4

Conclusions and follow-up

As far as the continuation of the monitoring of the economic performance of marine capture fisheries is concerned it was proposed that from now on, the countries, which so far participated in the study, should take care of updating the national cost earnings studies, which had so far been carried out with support of FAO. It was recommended that FAO's future involvement should focus on specialised studies. As priorities for future studies, the following three areas/topics were identified:

- The economic impact of direct Government financial transfers on the economic and financial performance of marine capture fisheries.
- The impact of fish utilisation, trade and value addition on the economic and financial performance of marine capture fisheries.
- The economic efficiency of selective and resource and environmentally friendly fishing practices.

More in detail the following studies and follow-up activities were proposed:

- Publication of study findings and workshop proceedings as FAO Fisheries Technical Paper.
- Desk study on the impact of revenue enhancing and cost reducing Government financial transfers in the European Union on economic performance of marine capture fisheries.
- Case studies (India, Indonesia, Republic of Korea, China, Barbados, Trinidad and Tobago, Antigua and Barbuda, Norway) on quantification of Government Financial Transfers in relation to value of fish production by fisheries sub-sectors and assessment of positive and negative effects of Government Financial Transfers on economic performance of marine capture fisheries and preparation of guidelines for responsible and efficient use of Government Financial Transfers and Economic Incentives.
- Regional case study on changes of fish utilisation and trade flows in Asia and the Pacific over the last decade and their impact on incomes, foreign exchange earnings and availability and cost of fish and fishery products.
- Case studies on costs and earnings of value addition and post harvest fisheries for the following species/commodities/utilisation practices i.e. Alaska Pollock (Norway), anchovy/sardine threadfin bream (Thailand), fresh fish (Europe), on board versus on shore processing (Europe), Hake (Peru, Argentina).
- Case studies for the identification of environmentally/resource friendly and economic efficient tuna fishing methods in developing and developed countries (among small/medium-scale longlining, large-scale longlining, purse seining, handlining and trolling with and without FADs, medium-scale drift gillnetting, small/medium and large-scale pole and line fishing).

Annex I

Technical, operational and economic characteristics of selected fishing vessels – by country

1. CHINA

TABLE 25
Technical and operational characteristics of Chinese fishing units

Type of vessel	Length (m)	GRT	Kw	On board storage facilities	Fishing gear	Crew	Ownership
Bottom pair trawler	25 - 28	80 - 95	185	Fishhold 24 m^3 + freezing 3t/day	Trawl	15	Shared in village
Single board trawler	26	65	110		Trawl	8	Shared in village
Set netter	29.5	67	150	26 m^3	Set net	16	Shared
Stow netter	30.5	107	200	37 tons	Set net	12	Shared
Purse seiner & set net	36	153	185	n.c	1 purse seiner, 4 set nets	14	Shared
Purse seiner	27.8 42.4	37.8 80	280 440	12.4 m^3 137 m^3	2 purse seines	5 + 22	State owned company
Squid jigger	43.5	270	440	167 m^3	10 - 12 jigging machines with 30 x 2 hooks	28 - 30	State owned company

Type of vessel	Distance of fishing grounds	Fishing days	Average duration of fishing trips	Fishing seasons (off-seasons)
Bottom pair trawler	8 n mi	200	7 - 10 days	Jan-May and Sept.-Dec (Jun-Aug)
Single board trawler	8 n mi	200	10	Jan-May and Sep-Dec (Jul-Aug)
Setnetter	20 n mi	210	12 - 14	Jan-Jun and Oct-Dec (Jul-Sept)
Stow netter	25 n mi	250	11 - 14	Jan-May and Sept -Dec (Jun-Aug)
Purse seiner & set net	150 n mi	258	11	Jan-Jun and Oct-Dec (Jul-Sept)
Purse seiner	12 n mi	250	40 - 50	Jan-Feb and Jun-Dec (Mar-May)
Squid jigger	150 n mi	250		15 May-15 Jan (15 Jan-15 May)

TABLE 26

Economic and financial performance of Chinese fishing vessels (in US$)

Type of vessel	Bottom pair trawler 25 - 2 m	Otterboard trawler 26 m	Set netter 29.5 m	Stow netter 30.5 m
Total Earnings	**64 605**	**33 976**	**61 759**	**46 506**
Fuel & lubricants	24 096	15 060	2 702	8 434
Harbour dues	72	108	2 410	2 410
Labour share, wages	25 904	6 747	3 614	3 614
Gear expenses	2 410	2 241	2.530	18 795
Repairs and maintenance	4 619	3 614	4 940	7 349
Fishing licence	482	313	482	361
Vessel insurance	482	241	3 012	3 012
General expenses	1 807	4 217	2 048	1 851
Taxes	1 012	988	4 217	4 217
Total costs of operation	**61 084**	**33 529**	**25 955**	**50 043**
Gross cash flow	**3 521**	**447**	**35 804**	**- 3 537**
Depreciation	9 398	1 735	1 133	6 284
Interest	11 277	2 082	1 183	7 108
Net profit	**- 17 154**	**- 3 370**	**33 488**	**- 18 929**

Type of vessel	Purse seiner & set net	Purse seiner (3 boats)	Squid Jigger
Total Earnings	**133 205**	**558 165**	**371 137**
Fuel & lubricants	15 060	61 311	40 770
Harbour dues	93	10 341	9 469
Labour share, wages	79 516	157 471	70 277
Gear expenses	28 916	30 344	83 511
Repairs and maintenance	16 667	90 724	60 081
Fishing licence	771	7 229	361
Vessel insurance	602		
General expenses	2 651	13.474	9 639
Taxes	1 516	9 085	5 873
Total costs of operation	**145 996**	**379 979**	**279 981**
Gross cash flow	**- 12 791**	**178 186**	**91 156**
Depreciation	3 470	11 640	4 819
Interest	3 470	16 942	5 870
Net cash flow	- 19 731	149 604	80 467

2. KOREA

TABLE 27

Technical and operational characteristics of Korean fishing units

Type of vessels	GRT Average	KW Average	On board facilities/ processing and storage	Fishing gear	Crew	Sharing system
Offshore stow net	74	345	Freezer storage = 120 m^3 Freez. cap. = 13 t/day	3 sets of nets HR 54 m	8	Minimum wages + share
Offshore jigging	77	396	Freezer storage = 110 m^3 Freez. cap = 26 t/day	300 - 900 hooks	12	•
Large purse seine	126	742	Fishhold = 250 m^3	Seine 900 - 1000 m x 200 - 300 m	73	Fixed wages + share
Anchovy mid-water trawl	35	262		Trawl 700 m	58	Fixed wages
Large otter trawl	139	1 068	130 m^3 + freez cap = 32 t/day	Trawl Net mouth 131 - 147 m HR 34 - 48 m	18	Fixed wages + share
Large pair-trawl	90	463	130 m^3 + freez. cap = 32 t/day	Trawl HR 54 - 114 m	23	•
Danish seine (average)	69	292	100 m^3 + Freez. cap. = 13 t/day HR 50 - 104 m	Seine	8 - 9	Minimum wages + share
Eastern Sea Trawl	60	427	Fishhold = 60 m^3	Trawl Net mouth 129 m HR 27 - 31 m	8	•

Type of vessel	Fishing days	Days at sea	Fishing seasons (off-seasons)
Offshore stow net	165	231	All year
Offshore jigging	150	168	•
Large purse seine	210	254	•
Anchovy mid-water trawl	196	196	Jul-Mar (Apr-Jun)
Large otter trawl	201	226	All year
Large pair trawl	229	243	•
Large Danish seine	180	195	•
W-Southern Sea middle Danish seine	212	235	•
Eastern Sea middle Danish seine	159	159	•
Eastern Sea trawl	186	193	•

TABLE 28
Economic and financial performance of Korean fishing vessels (in US$)

Investment (in US$)

Investments	Hull, engine and propulsion	Fishing gears and accessories	Deck equipment and others	Total value
Type of vessel				
Offshore Stow net	124 659	38 751	9 013	172 423
Offshore Jigging	232 546	41 345	18 220	292 111
Large purse Seine	3 454 756	292 868	545 538	4 293 162
Anchovy mid-water trawl	625 494	123 736	155 351	904 581
Large otter trawl	1 362 791	49 346	25 192	1 437 329
Large pair trawl	408 862	75 606	25 656	510 124
Large Danish seine	99 230	13 923	18 069	131 222
W-South Sea - middle Danish seine	250 251	14 332	11 043	275 626
Eastern Sea - middle Danish seine	189 230	8 000	11 897	189 127
Eastern Sea trawl	143 590	14 359	12 171	170 120

Economic and financial performance

Type of vessel	Offshore Stow netter	Offshore Jigger	Eastern Sea Trawler
Total earnings	**225 399**	**216 192**	**215 694**
Fuel	52 308	47 626	29 773
Other running costs	14 137	11 218	8 172
Labour share, wages	86 906	89 163	69 152
Other labour charges	8 188	8 435	3 330
Gear expenses	23 048	15 299	9 813
Repairs and maintenance	17 982	13 754	10 305
General expenses	8 361	8 468	5 643
Taxes	1 373	1 656	840
Total costs of operation	**210 303**	**191 619**	**135 028**
Gross cash flow	**15 096**	**24 573**	**80 666**
Depreciation	5 948	11 661	6 538
Interest (1)	5 632	9 542	5 557
Net profit	**3 518**	**3 370**	**68 571**

(1) Average amount for repayment on six year loan 80 percent of investment. Interest rate seven percent

Type of vessel	Large Purse seiner	Anchovy mid water trawler	Large otter board trawler	Large pair trawler
Total Earnings	**4 113 017**	**1 168 173**	**1 166 634**	**964 621**
Fuel	599 839	182 661	231 873	236 694
Other running costs	102 768	44 673	27 919	35 566
Labour share, wages	1 104 821	435 532	246 913	204 896
Other labour charges	137 726	24 017	45 203	21 043
Gear expenses	155 230	72 568	67 609	68 318
Repairs and maintenance	404 600	59 810	60 010	75 793
General expenses	140 534	38 135	39 450	44 686
Taxes	65 145	11 950	16 350	14 112
Total costs of operation	**2 710 663**	**869 346**	**735 327**	**703 106**
Gross cash flow	**1 402 354**	**298 827**	**431 307**	**261 515**
Depreciation	150 890	28 009	54 314	19 943
Interest (1)	140 242	29 549	46 952	16 664
Net cash flow	**1 111 222**	**241 269**	**330 041**	**224 908**

(1) Average amount for repayment on six year loan 80 percent of investment. Interest rate seven percent.

Type of vessel	Large Danish seiner	W-South Sea middle Danish seiner	Eastern Sea middle Danish seiner
Total Earnings	**362 046**	**286 841**	**172 646**
Fuel	70 973	46 643	18 049
Other running costs	14 480	14 876	5 198
Labour share, wages	93 770	86 819	59 481
Other labour charges	10 443	11 463	2 854
Gear expenses	26 948	18 619	6 590
Repairs and maintenance	25 604	16 164	11 552
General expenses	11 841	8 217	5 281
Taxes	3 627	2 210	603
Total costs of operation	**257 686**	**205 011**	**109 608**
Gross cash flow	**104 360**	**81 830**	**63 038**
Depreciation	4 973	9 446	6 256
Interest (1)	4 287	9 004	6 178
Net profit	**95 100**	**63 380**	**50 604**

(1) Average amount for repayment on six year loan 80 percent of investment. Interest rate seven percent.

3. THAILAND

TABLE 29
Technical and operational characteristics of Thai fishing units

Type of vessel	Length (m)	Tonnage (GRT)	Volume fish hold (metric tons)	Fishing Gear				Crew size
				quantity	wide	long	deep	
Otterboard Trawl								
< 14 m	11.2	8	4	2	12		1	4
14 - 18 m	16.8	28	23	2	18		3	8
18 - 25 m	19.6	50	31.5	2	20		6	18
Pair Trawl								
14 - 18 m	18	36	16.7	2	15		3	14
18 - 25 m	21.2	58	60	3	20		6	21
Push Net								
< 14 m	11.2	3	1.6	2	9	14	4	2
14 - 18 m	18.8	25	2.3	3	12	24	8	4
18 - 25 m	20.2	45	5.8	3	15	35	14	5
Purse Seine								
< 14 m	13	15	3.2	1		250	40	13
14 - 18 m	18	30	16	1		600	80	25
18 - 25 m	21.5	45	49.3	1		800	110	34
Anchovy Falling net								
< 14 m	13.3	10	3.7	1	12	18	25	4

Ownership & operation

Type of vessel	Ownership	Fishing days/year	Average duration of fishing trip (days)	Fishing seasons
Otterboard Trawl				
< 14 m	Individual	201	4	All year
14 - 18 m	Individual	250	10	All year
18 - 25 m	Individual	289	11	All year
Pair Trawl				
14 - 18 m	Individual	250	10	All year
18 - 25 m	Individual	280	11	All year
Push Net				
< 14 m	Individual	180	1	All year
14 - 18 m	Individual	208	2	All year
18 - 25 m	Individual	267	8	All year
Purse Seine				
< 14 m	Individual	120	1	May-October
14 - 18 m	Individual	256	2	All year
18 - 25 m	Individual	230	10	All year
Anchovy Falling Net				
< 14 m	Individual	144	1	May-October

TABLE 30

Economic and financial performance of Thai fishing vessels (in US$)

Investment costs (in US$)

Type of vessel	Hull	Deck equipment	Engine and propulsion	Fishing gear and equipment	Total
Otterboard Trawl					
< 14 m	4 794	561	1 520	1 121	7 995
14 - 18 m	23 559	3 180	4 670	4 629	36 038
18 - 25 m	26 351	5 548	14 096	10 521	56 516
Pair Trawl					
14 - 18 m	16 409	3 195	8 834	3 986	32 423
18 - 25 m	40 432	9 530	25 676	10 776	86 417
Push Net					
< 14 m	3 133	452	1 440	2 211	7 236
14 18 m	21 216	690	5 784	4 743	32 433
18 - 25 m	27 413	1 976	12 529	12 962	54 881
Purse Seine					
< 14 m	3 514	434	1 622	14 932	20 501
14 - 18 m	17 476	7 708	8 973	37 446	71 603
18 - 25 m	38 803	14 459	20 656	26 231	100 150
Anchovy Falling Net					
< 14 m	4 351	461	1 216	2 806	8 834

Economic and financial performance

Type of vessel	Otterboard Trawler			Pair Trawler
	< 14 m	14 - 18 m	18 - 25 m	14 - 18 m
Total earnings	**21 072**	**63 478**	**88 672**	**114 622**
Fuel	7 178	23 270	34 722	48 448
Lubricant	368	881	1 289	725
Harbour dues	34	115	313	23
Food	2 190	2 842	3 081	4 051
Labour share, wages	4 195	11 884	16 948	29 029
Gear expenses	1 545	2 846	3 805	4 735
Repairs & maintenance	1 798	4 925	6 554	9 426
Licence fee	26	52	57	90
General expenses	1 632	7 600	8 529	13 141
Taxes	60	95	97	122
Total costs of operation	**19 026**	**54 510**	**75 395**	**109 790**
Gross cash flow	**2 046**	**8 968**	**13 277**	**4 832**
Depreciation	244	993	2 719	1 794
Interest	562	493	529	1 532
Net profit	**1 240**	**7 482**	**10 029**	**1 506**

Type of vessel	Pair Trawler	Push net		
	18 - 25 m	< 14 m	14 - 18 m	18 - 25 m
Total earnings	**204 033**	**12 520**	**38 838**	**55 032**
Fuel	51 864	4 453	18 703	26 579
Lubricant	1 738	182	386	593
Harbour dues	34	43	304	434
Food	5 512	798	1 671	1 851
Labour share, wages	32 975	2 950	2 361	9 834
Gear expenses	5 597	1 362	1 783	4 107
Repairs & maintenance	11 396	1 585	4 384	4 517
Licence fee	90	17	20	66
General expenses	18 509	259	1 707	3 546
Taxes	165	25	41	41
Total costs of operation	**127 880**	**11 674**	**36 360**	**51 568**
Gross cash flow	**76 153**	**846**	**2 476**	**3 464**
Depreciation	4 297	158	944	1 374
Interest	2 005	417	775	959
Net profit	**69 851**	**271**	**759**	**1 131**

Type of vessel	Purse seiner			Anchovy Falling net
	< 14 m	14 - 18 m	18 - 25 m	< 14 m
Total earnings	**40 703**	**124 916**	**158 547**	**11 698**
Fuel	5 500	23 176	19 309	1 323
Lubricant	395	1 355	1 584	232
Harbour dues	49	405	541	41
Food	2 465	5 466	7 259	477
Labour share, wages	12 562	38 677	43 525	3 080
Gear expenses	2 838	5 696	9 20	1 224
Repairs & maintenance	946	3 649	9 850	1 308
Licence fee	13	88	102	4
General expenses	2 087	7 167	7 347	1 230
Taxes		95	185	
Total costs of operation	**26 855**	**85 774**	**99 322**	**8 916**
Gross cash flow	**13 848**	**39 142**	**59 225**	**2 779**
Depreciation	305	1 250	1 986	375
Interest	1 351	2 584	5 973	544
Net profit	**12 192**	**35 308**	**51 264**	**1 860**

4. INDONESIA

TABLE 31
Technical and operational characteristics of Indonesian fishing units

	Central Java purse seiner	Central Java purse seiner	East Java purse seiners	Pole and liner	Pole and liner	Tuna longliner	Gillnetter
Ownership	private	private	private	private	private	private	private
Material of hull	wood	wood	wood	wood	wood	wood	wood
Length of vessel (m)	15.5	27 6	19	13	25	26	17
Gross tonnage	30 - 40	100 - 120	29	10 - 15	40 - 50	67	26
Engine (HP)	120	310	2 x 30 OB	82	346	343	108
Fish hold							
Capacity (tons)	18	82	28	9	29	29	24
Preservation material	ice, salt	ice, salt		ice	ice	ice	ice
No of crew							
Skipper	1	1	1	1	1	1	1
Engineer	1	1	2	1	1	1	1
Master	1	1	2				
Cook	1	1	39	1	1	1	
Crew	23	35		13	29	9	6
Dimensions of fishing gear	300 m long, 40 m deep	400 - 600 m long, 60 m deep	300 m long, 40 m deep				
Peak season (months)	5	5	3	4	4	5	3
Fishing trips	4	4	60	12	10	3	3
Days per trip	7 - 10	10 - 20	1	2	2	60 - 70	30
Mid season (months)	4	4	3	5	5	4	5
Fishing trips	5	3	45	7	6	2	3
Days per trip	10 - 15	20 - 30	1	3	4	40 - 50	40
Low season (month)	3	3	6	3	3	3	4
Fishing trips	3	2	102	5	3	1	2
Days per trip	15 - 20	30 - 40	1	4	5	20 - 30	35

TABLE 32
Economic and financial performance of Indonesian fishing vessels (in US$)

Investment cost (in US$) [15]

	Central Java purse seiner, 30 - 40 GT		Central Java purse seiner, 100 - 120 GT		East Java purse seiners, 29 GT		Pole and liner 10 - 15 GT		Pole and liner 40 - 50 GT		Tuna longliner		Gillnetter	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Hull, fishhold	11	15 260	11	28 126	11	16 516	11	1 719	11	14 844	11	63 125	10	7 396
Deck equipment							6	52	6	526				
Engine	7	12 708	7	12 241	7	7 578	7	5 761	7	20 925	7	8 713	7	5 031
Propulsion	7		7		3	781	7		7		7		7	
Fishing gear	4	6 573	4	13 126	4	9 082	4	57	4	148	7	6 473	10	4 554
Other equipment							7	313	7	5 104	5	7 753	5	1 177
Total		34 531		53 494		35 957		7 902		36 953		86 064		16 159

[15] A = life time (yrs), B = cost

Economic and financial performance (in US$)

	Central Java purse seiner, 30 - 40 GT	Central Java purse seiner, 100 - 120 GT	East Java purse seiners, 29 GT	Pole and liner 10 - 15 GT	Pole and liner 40 - 50 GT	Tuna longliner	Gillnetter
Total earnings	31 158	62 955	32 657	23 825	45 372	86 882	16 484
Fuel	2 841	9 282	3 154	2 604	4 993	12 450	2 521
Lubricant	294	1 263	802	276	427	603	319
Harbour dues	6	5				147	113
Food	2 235	3 891		3 458	5 339	48 265	1 090
Labour share, wages, social insurance	6 901	22 731	12 627	10 557	15 461	11 330	3 024
Gear repair and maintenance	285	563	661	50	81	170	232
Vessel repair and maintenance	735	1 756	1 383	1 729	3 406	39 375	2 703
Ice and salt	1 126	1 616	650	721	1 130	3 359	940
Licence fees	8	9		6	14	142	104
General expenses	309	422		128	172	2 080	123
Total operational expenses	17 426	43 561	19 434	20 274	32 756	67 086	11 799
Gross cash flow	13 732	19 394	13 223	3 551	12 612	21 796	6 685
Depreciation	4 901	7 843	3 190	1 216	5 085	9 878	2 149
Interest	863	1 337	899	198	924	2 152	454
Net profit before taxes	7 968	10 214	9 134	2 135	6 607	9 766	4 082

5. INDIA

TABLE 33

Technical and operational characteristics of Indian fishing units

Type of vessel	Length (m)	KW	On-board facilities / storage	Fishing gear	Crew	Ownership	Fishing days
Wooden kattumaram Orissa	5.5			Trammel nets	4	Individual	240
FRP boat Orissa	6.5	5		Nets + Hooks and lines		*	300
Dolnetter Maharashtra	9/12	37/44	Ice hold	Bag net (50 m x 20m)	6 - 7	*	160
Gill-netter/Trawler Gujarat	16.8	87	10 tons	Trawls + Gillnets 500/1000m x 10/20m	7 - 9	*	245
Trawler Gujarat	16.6	87	10 tons	Trawls	7 - 9	*	200
Trawler / Sona boat Orissa	12.8	88	6 tons	Trawls head rope 19,80m	6	*	200
Purse seiner Karnataka	14.6	79	10 m^3	Purse seine 300/450mx30/45m	25	*	200
Tuna Long liner	36	590	110 m^3	Longline			160

TABLE 34

Financial and economic characteristics of Indian fishing units

Investment costs (in US$)

Investments	Hull	Engine and propulsion	Fishing gear	Total value
Depreciation rate	4 %	10 %	20 %	
Type of vessel				
Wooden Catamaran 5.5 m	390		229	619
FRP Boat 8.5 m	2 444	732	1 500	4 676
Dolnetter 9/12 m	2 927	1 463	1 829	6 219
Gill-netter / Trawler	17 366	7 991	7 082	32 439
Stern Trawler 16.8 m	17 366	7 991	2 735	28 092
Sona boat 12.8 m	28 561	7 805	3 658	40 024
Purse seiner 14 6 m	40 114	7 878	18 171	66 163
Tuna longliner 36 m	426 829	182 927	36 585	646 341

Economic and financial performance

Type of vessel	Wooden Catamaran 5.5 m	FRP boat 8.5 m	Dolnetter 9/12 m	Gillnetter Trawler 16.8 m
Total earnings	**3 161**	**7 526**	**12 073**	**29 745**
Fuel		1 932	1 024	10 853
Lubricant		386	261	186
Harbour dues			98	88
Ice			922	1 643
Food				956
Costs of sell fish		226	146	
Other running costs		150		269
Labour share, wages	362	52	2 682	2 732
Other labour charges				146
Gear expenses	76			963
Repairs & maintenance	39	658	439	1 790
Vessel insurance	15	140	280	1 069
General expenses	131	12	2	
Total costs of operation	**623**	**3 556**	**5 854**	**20 716**
Gross cash flow	**2 538**	**3 970**	**6 219**	**9 030**
Depreciation	15	471	263	1 478
Interest	32	82	322	1 678
Net profit	**2 491**	**3 417**	**5 634**	**5 874**

Type of vessel	Stern Trawler 16.8 m	Sona boat 12.8 m	Purse seiner 14.6 m	Tuna Longliner 36 m
Total earnings	**31 082**	**37 835**	**44 634**	**824.390**
Fuel	10 853	6 049	5 976	170 732
Lubricant	186	2 012	976	-
Harbour dues	88			2 439
Ice	1 643	1 463	1 829	
Food	956	976	4 878	-
Costs of sell fish		1 131		136 585
Other running costs	269	757	1 717	5 366
Labour share, wages	2 732	2 439	11 158	82 927
Other labour charges	146			
Gear expenses	311	1 216	5 996	-
Repairs & maintenance	1 790	2 021	2 439	85 366
Vessel insurance	937	1 201	1 098	-
General expenses	-	24	-	69 512
Total costs of operation	**19 911**	**21 291**	**36 067**	**552 927**
Gross cash flow	**11 171**	**16 544**	**6 567**	**271 463**
Depreciation	2 041	1 667	6 026	35 366
Repayment	495	2 070	1 165	27 287
Net profit	**8 635**	**12 807**	**1 376**	**208 810**

6. SENEGAL

TABLE 35

Technical and operational characteristics of Senegalese fishing Units

Industrial fishing

Type of vessel	Length (m)	Tonnage (GRT)	KW	On board facilities/storage	Fishing gear	Crew size	Ownership
Coastal seiner	24 - 31	60	295	Ice + fishhold (50t)	seine (620 - 950m)	15 - 20	Company owned
Pelagic trawler	62 - 104	1 900 - 4 900	1 470 - 4 270	Freezing +storage 5700t	Trawl (150 - 480m)	25 - 30	Chartered vessel
Coastal trawler (demersal / ice)	27 - 49	120 - 480	295 - 1 470	Ice + fishhold (66t)	Trawl (48m)	15 - 25	Company owned
Coastal trawler (demersal / feezer)	32 - 47	160 - 540	370 - 1 990	Freezing 6t/day + storage 100t	Trawl (60m)	20 - 25	Company owned
Deep sea trawler (ice)	27 - 39	120 - 390	295 - 920	Ice + fishhold (100t)	Trawl (72m)	13 - 22	Company owned
Deep sea trawler (Freezer)	27 - 38	120 - 415	570 - 1 360	Freezing 2t/day + storage 100t	Trawl (83m)	13 - 22	Company owned
Off-shore fishing (pelagic)							
Seiners	36 - 77	210 - 3730	730 - 2 940	Freezing + storage 400 - 1000t	Seine (1 500m)	21 - 28	Company owned
Pole and Liner	20 - 45	60 - 380	220 - 730	Ice + fishhol (40 - 90t)	Poles and lines	17 - 33	Company owned
Longliner	20 - 60	60 - 410	295 - 1 100	Ice or freezing	Longlines 1500 - 3500 hooks	20 - 40	Company owned

Type of vessel	Fishing days	Average duration of fishing trips	Fishing seasons
Coastal seiner	78/year	12 - 13 hours	All year
Pelagic trawler	270	3 months	"
Coastal trawler (demersal/ice)	101	5 days	Maximum Oct-June
Coastal trawler (demersal/freezer)	234	17 days	"
Deep sea trawler (ice)	203	6 days	"
Deep sea trawler (freezer)	240	40 days	"
Offshore fishing (pelagic)			
Seiner	120	40 days	Feb-May
Pole and liner	120	7 - 17 days	Nov-Feb
Longliner (ice)	180	15 - 20 days	
Longliner (freezer)	240	8 months	

Artisanal fishing

Type of vessel	Length (m)	KW	On board facilities / storage	Fishing gear	Crew size	Sharing system
Purse seiners (2 canoes fishing together)	12 - 15 m 18 - 20 m	3 engines x 54	up to 20 t no ice	Seine 200 - 270 m x 42 - 48 m	18 (average)	1/3 for the net 2/3 shared between crew boat, engines
Encircling gillnetters	10 - 17	1 engine x 10/35	3 - 7 t fishhold no ice	250 - 450 m x 7 - 12 m	6/8	1 share/man 1 share/canoe 1 share/engine 1 share/net
Handliners	12 - 14 m	1 engine x 35/55	2 - 4 t ice + fishhold	Handlines	10	1 share/man 1 share/canoe 1 share/engine
Multipurpose canoes	7 - 2 m	1 engine x 10/20	0 5/107 t insulated boxes (only for breams)	Gillnets handlines pots	6	1 share/man 1 share/canoe 1 share/engine 1 share/net

Type of vessel	Fishing days	Average duration of fishing trips	Fishing seasons
Purse seiners	20 - 23 days per month	8 - 10 hours	All year (maximum Nov-May)
Encircling gillnetters	"	"	"
Handliners	3 trips per month	6 - 7 days	All year
Multipurpose canoes	28 days per month	8 - 10 hours	"

TABLE 36

Financial and economic characteristics of individual fishing units

Investment costs, industrial fishing (in US$)

Deep sea trawler 22 m (1996)	Investment in US$	Depreciation rate and amount	
Hull	692 730	4 %	27 710
Engine and propulsion	161 820	10 %	18 180
Deck equipment and safety	63 640	10 %	6 360
Equipment for navigation, fish detection and communication	23 640	10 %	2 360
Fish preservation and storage	100 000	4 %	4 000
Fishing gear and equipment	29 090	20 %	5 820
Total	**1 090 920**		**64 430**
Purse seiner for small pelagic (1998)	Investment in US$		Depreciation/year
Total	**508 000**		**25 400**

Economic and financial performance, industrial fishing (in US$)

Type of vessel	Deep sea trawler	Purse seiner (small pelagic fish)
Earnings	**554 240**	**101 700**
Fuel and lubricants	164 407	25 424
Harbour dues	6 475	
Other running costs	29 153	
Labour share, wages and charges	105 085	33 898
Repairs and maintenance	76 271	20 338
Vessel insurance		5 932
Fishing licence		1 017
General expenses	69 323	8 475
Taxes	30 508	
Total costs of operation	**483 222**	**95 084**
Gross cash flow	**71 018**	**6 816**
Depreciation	50 847	25 424
Interest (1)	44 600	20 788
Net profit	**- 24 429**	**- 39 596**

(1) Average amount for repayment on 13-year loan 80 percent of investment. Interest rate 9.5 percent.

Investment costs and depreciation, artisanal fishing (in US$)

Investments	Canoe	Engines	Fishing gear	Other equipment	Total value
Purse seiner	3 220	3 050	4 240	340	10 850
Encircling gillnetter	2 370	2 540	2 540	340	7 790
Handliner	3 220	3 050	340	2 030	8 640
Multipurpose canoe	1 440	1 020	850	170	3 480
Depreciation					
Canoe	412	339	412	206	
Engine	1 525	1 271	1 525	508	

Economic and financial performance, artisanal fishing (in US$)

Type of vessel	Purse seiner	Encircling gillnetter	Handliner	Multipurpose canoe
Total earnings	**30 510**	**20 340**	**64 400**	**10 170**
Fuel	2 491	2 034	5 085	407
Ice			2 203	68
Food	407	339	1 525	119
Bait			763	152
Other running costs	186	85	847	339
labour charges	16 454	13 005	44 986	7 053
Gear expenses	847	508		169
Repairs and maintenance	1 254	983	1 254	458
Vessel insurance	424	254	339	85
Total costs	**22 063**	**17 208**	**57 002**	**8 850**
Gross cash flow	**8 447**	**3 132**	**7 398**	**1 320**
Depreciation	1 937	1 610	1 937	714
Interest(1)	846	608	674	271
Net profit	**5 664**	**914**	**4 787**	**335**

(1) Average amount for repayment on two-year loan 80 percent of investment. Interest rate 13 percent.

7. NORWAY

TABLE 37
Technical and operational characteristics of Norwegian fishing units

Type of vessel	Length (m)	GRT	On board facilities	Fishing gear
Factory trawler	60.7	754	Freezing	Trawl
Freshfish trawler	46.7	328	Ice + fishhold	Trawl
Purse seiner	25.2	116		Purse seine
Norway pout trawler	35.3	195		Trawl
Gillnetter, Handliner	10	10	Ice + fishhold	Gillnets, handlines
Gillnetter, Handliner	15.4	28	"	"
Danish seiner	17.6	42		Danish seine
Coastal vessel S. Norway	10.1	10	Ice + fishhold	Gillnets, handlines, longlines
"	14.6	26	"	"
Longliners N Norway	10.6	11	"	longline
"	15.1	24	"	"
Shrimp trawler	11.1	14	Ice + fishhold	Trawl
"	15.3	26	"	"

TABLE 38
Economic and financial performance of Norwegian fishing vessels (in US$)

Type of vessel	Factory trawler 60.7 m	Freshfish trawler 46.7 m	Purse seiner 25.2 m	Norway pout trawler 35.3 m
Total earnings	**5 060 472**	**2 348 565**	**854 810**	**736 070**
Fuel and lubricant	387 361	216 071	40 633	115 186
Bait, ice, salt, packaging materials	136 309	17 661	3 832	21 266
Other running costs	98 131	51 976	13 936	13 610
Labour shares, wages	1 451 613	744 935	345 180	245 747
Social insurance	39 349	15 153	6 487	5 483
Other labour charges	189 629	86 760	29 147	28 524
Gear expenses	199 382	150 269	54 110	58 263
Repairs & maintenance	697 055	307 156	73 931	115 645
Vessel insurance	73 898	47 901	24 567	26 286
General expenses	841 463	252 675	61 864	47 152
Total costs of operation	**4 115 190**	**1 890 557**	**655 687**	**677 162**
Gross cash flow	**945 282**	**458 008**	**199 123**	**58 908**
Depreciation	414 840	174 439	69 924	102 026
Net financial expenses	258 636	109 434	67 489	74 125
Net profit	**271 806**	**174 135**	**61 710**	**- 117 243**

Type of vessel	Gillnetter Handliner 10 m	Gillnetter Handliner 15.4 m	Danish seiner 17.6 m	Coastal vessel South Norway 10.1 m	Coastal vessel South Norway 14.8 m
Total earnings	**61 438**	**244 462**	**299 318**	**62 697**	**193 391**
Fuel & lubricant	2 387	7 473	13 826	2 637	7 449
Bait, ice, salt	235	777	509	218	1 338
Other running costs	1 249	2 429	5 094	1 397	1 800
Labour share, wages	32 389	120 683	138 849	32 595	92 358
Social insurance	357	2 633	3 062	269	1 834
Other labour charges	2 000	8 050	9 945	2 000	6 826
Gear expenses	3 942	21 137	10 163	5 736	9 913
Repairs &maintenance	6 524	27 300	39 573	6 537	22 062
Vessel insurance	1 548	4 469	7 657	1 576	3 023
General expenses	3 839	13 695	18 888	4 179	9 689
Total costs of operation	**54 470**	**208 646**	**247 566**	**57 144**	**156 292**
Gross cash flow	**6 968**	**35 816**	**51 752**	**5 553**	**37 099**
Depreciation	3 132	11 046	24 495	3 749	14 258
Net financial expenses	1 858	7 949	21 831	1 605	7 243
Net profit	**1 978**	**16 821**	**5 426**	**199**	**15 598**

Type of vessel	Longliner North Norway 10.6 m	Longliner North Norway 15.1 m	Shrimp trawler 11.1 m	Shrimp trawler 15.3 m
Total earnings	**81 958**	**244 774**	**63 033**	**123 107**
Fuel & lubricant	2 649	6 798	3 904	11 505
Bait, ice, salt	2 094	8 501	224	118
Other running costs	1 315	3 936	646	1 713
Labour share, wages	43 107	128 469	33 039	57 687
Social insurance	462	1 815	132	1 298
Other labour charges	2 639	7 896	2 020	4 657
Gear expenses	3 270	7 489	4 028	5 240
Repairs & maintenance	6 350	18 575	8 835	13 009
Vessel insurance	1 801	3 927	1 086	2 404
General expenses	7 907	21 423	3 801	7 759
Total costs of operation	**71 594**	**208 829**	**57 715**	**105.390**
Gross cash flow	**10 364**	**35 945**	**5 318**	**17 717**
Depreciation	3 140	9 867	3 454	12 907
Net financial expenses	3 154	7 579	1 721	2 396
Net profit	**4 070**	**18 499**	**143**	**2 414**

8. GERMANY

TABLE 39
Technical and operational characteristics of German fishing vessels

Fleet segment	Length (m)	Tonnage GT	Engine KW	On board facilities/storage	Fishing gear	Crew	Ownership	Days at sea per year	Duration of trip (days)
Coastal fishery									
Inshore vessel	10 - 12	10	100	Ice	Gillnets, traps	2	individual	100 - 120	1
Cutter deep sea fishery									
Trawler	15 - 20	40	150			2 - 3		150	2 - 5
	22 - 25	130	200	Ice, insulated hold	Trawl nets	3 - 4	individual	180	4 - 6
	28 - 32	200	550			4 - 6		180	7 - 9
Shrimper	15 - 20	40	160	Ice, cooking facilities for shrimps	Beam trawls	2 - 3	individual	120 - 150	1 - 3
Deep-sea trawler fishery									
Pelagic trawler	60 - 90	4 566	2 937	Sorting, freezing storage	Pelagic trawls	35	Company	294	23
Groundfish trawler	60 - 80	2 180	2 602	Sorting, processing, freezing storage	Bottom trawls	33	Company	270	46

Volume, value and composition of catch

	Inshore and cutter deep sea fisheries				Shrimp fishery	Trawler deep sea fisheries	
Type of vessel	Inshore vessel 10 - 12 m	Trawling cutter 15 - 20 m	Trawling cutter 22 - 25 m	Trawling cutter 28 - 32 m	Shrimper 15 - 20 m	Pelagic trawler 60 - 8 0m	Groundfish trawler 60 - 80 m
Volume (t.)	12	225	360	900	65	27 340	3 780
Value (1000 US$)	54.03	169.7	278.4	451.8	162.8	9 634.7	5 499.4
Main species	Flatfish (sole, plaice), cod	Demersal fish (cod, haddock)	Demersal fish (cod, haddock)	Demersal fish (saithe, cod)	Shrimps *(Crangon crangon)*, sole	Mackerel, herring, anchovy, sardinella	Redfish, cod, halibut
Processing state	Fresh	Fresh	Fresh	Fresh	Fresh Cooked	Frozen	Frozen processe

TABLE 40
Financial and economic performance of German fishing units (in US$)

Investment costs

type of vessel	Initial value	Actual value	Replacement value	Depreciation	Interest
Inshore 10 - 12 m	no info	102 300	340 900	13 636	3 977
Cutter 15 - 20 m	no info	306 800	1 136 400	45 455	12 500
Cutter 22 - 25 m	no info	500 000	2 272 700	90 909	19 886
Cutter 28 - 32 m	no info	909 100	3 409 100	136 364	36 364
Shrimp trawler 15 - 20 m	no info	306 800	1 022 700	40 909	12 500
Pelagic trawler 60 - 80 m	17 556 800	10 738 600	26 363 600	1 704 545	136 364
Groundfish trawler 60 - 80 m	5 681 800	2 813 600	8 534 100	681 818	62 500

Economic and financial performance

Type of vessel	Inshore and cutter deep sea fisheries			
	Inshore vessel 10 - 12 m	Trawling cutter 15 - 20 m	Trawling cutter 22 - 25 m	Trawling cutter 28 - 32 m
Total earnings	**54 034**	**169 716**	**278 409**	**451 818**
Fuel & lubricants	6 307	8 636	24 318	36 636
Ice			2 218	4 545
Marketing costs	2 955		27 330	37 870
labour charges	13 466	44 204	80 455	124 602
Gear expenses and repairs & maintenance	3 693	23 580	26 591	70 057
Vessel insurance	2 045		10 000	18 352
General expenses	8 307		7 955	18 920
Total costs of operation	**34 773**	**76 420**	**178 865**	**312 782**
Gross cash flow	**19 261**	**93 296**	**99 544**	**139 036**
Depreciation	13 636	45 455	90 909	136 364
Interest	3 977	12 500	19 886	36 364
Net profit	**1 648**	**35 341**	**- 11 251**	**- 33 692**

Type of vessel	Shrimper 15 - 20 m	Pelagic trawler 60 - 80 m	Groundfish trawler 60 - 80 m
Total earnings	**162 841**	**9 634 659**	**6 284 659**
Fuel & lubricants	10 568	513 636	533 523
Ice, packaging materials	170		
Marketing costs	2 102	289 204	80 682
Labour share, wages and social insurance	36 523	2 950 568	2 592 614
Other labour charges		76 136	78 136
Gear expenses	23 239	463 636	134 091
Repairs and maintenance	-	1 106 818	811 932
Vessel insurance	8 136	222 727	107 955
General expenses	10 227	1 243 182	1 428 977
Total costs of operation	**90 965**	**6 865 907**	**5 765 910**
Gross cash flow	**71 876**	**2 768 752**	**518 749**
Depreciation	40 909	1 704 545	681 818
Interest	12 500	136 364	62 500
Net profit	**18 467**	**927 843**	**- 225 569**

9. FRANCE

TABLE 41
Technical and operational characteristics of French fishing units

Type of vessel	Length	KW	On board facilities/ storage	Fishing gear	Crew	Ownership	Fishing days
Handliners	8 - 10 m	50	Insulated fish hold	Spare hooks	1	Individual	200
Gillnetters	10 - 12 m	80	"	-	2	"	180
Gillnetters	12 - 20 m	100	Ice + insulated fish hold	Spare nets	4 - 5	"	180
Coastal seiners	15 m	150	"	-	7	Individual /2 - 3 partners	165
Coastal trawlers	12 - 14 m	200	"	-	2	Individual	200
Coastal trawlers	14 - 16 m	250	"	-	3	Individual	210
Deep sea trawlers(fish)	15 - 17.5 m	300	"	1 spare trawl	4	Individual/ 2 - 3 partners	225
Deep sea trawlers (Norway lobster)	17 - 19 m	350	"	"	5	"	225
Deep sea trawlers	19 - 20.5 m	400	"	"	5 - 6	"	250
Deep sea trawlers	20.5 - 24 m	450	"	"	5 - 6	Individual/2 - 3 partners/ company	250
Purse-seiners Mediterranean sea	27 - 33 m	700 - 800	Ice + seawater 60 m³ average fishhold 120 m³	Purse seine 1600/2000 m x 185/230 m	12 - 14	Individual	140 - 150

TABLE 42
Economic and financial performance of French fishing units (in US$)

Type of vessel	Handliners 8-10 m	Gillnetters 10-12 m	Gillnetters 12-20 m	Coastal seiners 15 m
Total earnings	**83 014**	**167 500**	**369 302**	**636 181**
Fuel	2 148	4 866	12 553	7 375
Harbour dues	98	61	334	1 542
Costs of selling fish	3 252	6 370	15 191	40 905
Other running costs	1 979	2 447	9 599	9 511
Labour share, wages	15 454	68 695	141 625	293 791
Social insurance	6 247	10 760	25 695	35 690
Gear expenses	4 968	16 437	35 589	32 069
Repairs and maintenance	6 361	11 292	31 115	47 167
General expenses	7 117	11 795	23 505	16 982
Total costs / expenses	**47 644**	**132 723**	**295 206**	**487 052**
Gross cash flow	**35 370**	**34 777**	**74 096**	**149 129**
Depreciation	9 773	20 627	31 180	31 955
Interest	1 898	4 631	9 946	9 029
Net profit	**23 699**	**9 519**	**32 970**	**108 145**

Type of vessel	Coastal trawlers 12 - 24 m	Coastal trawlers 14 - 16 m	Deep sea trawlers (fish) 15 - 17.5 m	Deep sea trawlers (Norway lobster) 17 - 19 m
Total earnings	**158 613**	**244 264**	**450 171**	**583 423**
Fuel	10 787	17 946	34 277	54 680
Harbour dues	20	180	9 742	32 117
Costs of selling fish	6 233	11 098	21 465	27 031
Other running costs	2 455	5 845	20 404	31 633
Labour share, wages	65 174	98 336	170 120	200 452
Social insurance	8 069	13 315	22 597	29 086
Gear expenses	8 158	12 535	20 838	25 135
Repairs and maintenance	15 169	27 695	50 084	57 794
General expenses	12 974	16 800	26 222	38 487
Total costs of operation	**129 039**	**203 750**	**375 749**	**496 415**
Gross cash flow	**29 574**	**40 514**	**74 422**	**87 008**
Depreciation	18 206	31 538	29 688	75 136
Interest	4 884	7 611	6 840	25 799
Net profit	**6 484**	**1 365**	**37 894**	**- 13 927**

Type of vessel	Deep sea trawler 19 - 20.5 m	Deep sea trawler 20.5 - 24 m	Purse seiner Mediterranean 27 - 33 m
Total earnings	**642 084**	**801 808**	**728 814**
Fuel	60 378	80 110	72 881
Harbour dues	23 435	27 943	1 695
Costs of selling fish	33 212	41 341	
Other running costs	29 305	33 811	50 847
Labour share, wages	225 389	258 409	228 814
Social insurance	30 095	36 513	50 847
Gear expenses	33 141	37 714	8 475
Repairs and maintenance	69 595	89 579	33 898
General expenses	42 856	55 437	59 322
Total costs of operation	**547 406**	**660 857**	**506 779**
Gross cash flow	**94 678**	**140 951**	**222 035**
Depreciation	29 557	63 233	118 644
Interest	8 419	22 413	16 949
Net profit	**56 702**	**55 305**	**86 442**

10. SPAIN

TABLE 43

Technical and operational characteristics of Spanish fishing units

Type of vessel	Length	KW	On board facilities	Fishing gear	Crew	Ownership	Fishing days
Semi-industrial trawlers (average)	20/25 m	300/500	Ice + insulated hold	2 trawls	8/9	Individual	250 /255
Industrial trawlers (average)	25/35 m	450/1050			10/12	Individual, 23 partners or company	210
Pole & liners (average)	15/25 m	100/300		Frooks and liners	15	Individual or 2 - 3 partners	170
Tuna seiners							
56 m	56	3000	Freezing in brine + feezer storage	1 seine	20	Company	295
64 m	64	3500		"	25	"	285
70 m	70	4500		"	23	"	270

TABLE 44

Economic and financial performance of Spanish fishing units (in US$)

Investment costs

	Trawler 30 m 236 GRT	Trawler 37 m 242 GRT	Pole and liner	Tuna seiner 69m
Hull	90 790	178 870		
Equipment	268 540	470 860		
Main engine	255 750	779 750		
Fishing gear	129 800	88 150		
Electronic devices	35 200	110 190		
Handwork	575 440	693 830		
Total	**1 355 520**	**2 321 650**	**1 102 000**	**15 631 700**

Depreciation:

In Spain, depreciation is calculated over 25 years for hull and equipment.

Interest:

Average amount for repayment on 13-year loan 80% of actual investment.
Interest rate 5%.

Economic and financial performance

Type of vessel	Trawler 25/35 m	Trawler 25/35 m	Trawler 20/35 m	Trawler 30/45 m	Trawler 30/45 m
Fishing zones ICES	IX	IX	VIII	VI,VII,VIII	VI,VII,VIII
Year	1998	1999	1998	1999	2000 (provis.)
Landings (tons)	110	110	150	250	250
Total earnings	**547 590**	**537 080**	**520 040**	**831 190**	**745 140**
Fuel & lubricant	76 128	75 446	70 942	124 678	111 771
Ice & food	8 681	8 951	6 125	6 306	4 757
Other running costs	14 023	14 066	14 807	17 519	15 705
Labour share	176 030	175 168	169 339	216 106	193 737
Social insurance	52 755	52 429	50 802	23 384	20 964
Repairs, maintenance, vessel insurance, general expenses	46 077	46 035	48 075	164 591	147 554
Taxes	21 362	20 140	16 858	20 258	21 116
Gross cash flow	**152 534**	**144 825**	**141 092**	**259 346**	**229 536**
Depreciation	90 152	86 316	87 703	173 590	151 088
Interest	22 704	21 099	22 064	46 125	39 235
Net profit	**39 678**	**37 410**	**31 305**	**37 631**	**39 213**

(1) 1998: 1 US$ = 0,90 Euros.
1999: 1 US$ = 0,94 Euros.
2000: 1 US$ = 1,08 Euros.

Type of vessel	Pole & liner 18 m	Pole & liner 24 m	Tuna seiner 56 m	Tuna seiner 64 m	Tuna seiner 70 m
Year	1999	1999	1998	1998	1998
Landings (t)	64	153	4500	5000	6000
Total earnings	**204 750**	**367 850**	**8 000 000**	**6 666 670**	**8 000 000**
Fuel	12 659	39 468	467 833	505 167	584 500
Lubricant		3 271	32 667	51 333	58 333
Harbour dues		11 394	25 170	31 500	38 767
Bait, ice, salt	1 598	4 936	65 333	59 500	70 000
Food	15 984	5 459	103 833	62 286	115 500
Costs of selling fish (1)		1 372	1 102 997	1 464 167	1 614 400
Other running costs		1 131	15 167	19 833	12 833
Labour share	61 902	169 416	707 000	1 116 500	1 146 833
Social insurance	5 115	35 745	177 333	252 000	176 500
Other labour charges		3 723	145 833	89 833	222 833
Gear expenses	3 197	4 936	128 333	89 381	115 500
Repairs and maintenance	13 427	14 362	351 167	624 167	700 000
Vessel insurance	3 197	4 787	92 167	72 333	121 333
General expenses		1 596	474 833	256 670	483 000
Taxes	4 324	2 711	419 407	337 838	387 338
Gross Cash flow	**63 347**	**63 544**	**1 690 927**	**1 634 162**	**2 150 330**
Depreciation	55 319	58 511	712 311	845 874	1 246 541
Interest	21 664 (2)	22 914 (2)	163 778	194 555	286 180
Net profit	**- 13 636**	**- 17 881**	**814 838**	**593 733**	**617 609**

(1) Discharging and selling.
(2) Estimate

11. ANTIGUA & BARBUDA

TABLE 45

Techno-economic and operational characteristics of Antiguan & Barbudian fishing units

Characteristics	Type of boat				
	Open	Cabin	Sloop	Launch wood	Launch fibreglass
Length (m)	5.7	6.8	11.2	11.6	9 5
Type of engine	Outboard	Outboard	Inboard	Inboard	Inboard
Power (Kw)	37	59	92	122	133
Fish Storage (Kg)	178	124	930	930	1006
Number of traps	40	40	150	150	150
Dimension of trap (m^3)	1.7	1.7	1.7	1.7	1.7
Trap hauler	No	Sometimes	Yes	Yes	Yes
Crew size	2	2	3	3	3
Ownership	Individual				
Fishing days	120	120	104	104	104
Average duration of trips (hours)	4 - 6	4 - 6	48	48	48
N° of traps hauled	20 - 40	20 - 40	150	150	150

TABLE 46

Financial and economic performance of Antiguan & Barbudian fishing units (in US$)

Investment costs

Investment	Hull	Engine	Fishing equipment	Traps	Total
Open boat	6 240	3 560 (Outboard)	430	3 380	13 610
Cabin	6 520	5 220 (Outboard)	1 970	3 770	1 9540
Sloop	2 4440	9 630 (Inboard)	4 760	4 780	4 3610
Launch (wood)	27 630	14 000 (Inboard)	3 890	15 480	61 000
Launch (fibreglass)	37 500	20 050 (Inboard)	4 570	10 770	72 890
Depreciation Rate	15 %	Outboard. 30 % Inboard 10 %	10 %		

N B Costs of investment and price for fuel are higher in Barbuda compared with Antigua.

Economic and financial performance

Type of boat	Open	Cabin	Sloop	Launch wood	Launch fibreglass
Length (m)	6.5	6.7	10.4	10.6	11.8
Power (KW)	37	58.7	85	127.6	178.1
Total earnings	**36 790**	**28 760**	**28 530**	**83 790**	**79 080**
Fuel	2 771	4 029	5 016	6 920	10 053
Lubricant	464	688	200	126	374
Ice	264	614	1 908	4 281	1 960
Food	348	533	859	1 067	1 433
Bait	1 474	1 644	4 267	5 973	4 971
Total labour charges	**1 807**	**1 111**	**2 370**	**15 289**	**2 889**
Trap replacement	2 142	1 057	3 551	5 413	5 752
Repairs & maintenance	398	523	2 658	1 974	3 256
Vessel insurance	74			516	769
Fishing licence	40	41	63	64	72
General expenses	7	9	9	9	9
Total costs of operations	**9 789**	**10 249**	**20 901**	**41 634**	**31 538**
Gross cash flow	**27 001**	**16 511**	**7 629**	**42 156**	**47 542**
Depreciation	2 048	3 060	5 106	5 934	8 850
Interest (1)	361	568	2 281	2 656	2 674
Net profit	**24 592**	**14 883**	**242**	**33 566**	**36 016**

(1) Average amount for repayment on five-year loan 80 percent of investment. Interest rate 6 percent.

Type of boat	Open Antigua	Open Barbuda
Length (m)	6.3	6.9
Power (KW)	37.8	35.8
Total earnings	**29 280**	**48 060**
Fuel	2 754	2 796
Lubricant	454	479
Ice	440	
Food	415	249
Bait	1 438	1 529
labour charges	2 133	1 319
Trap replacement	1 465	3 157
Repairs and maintenance	344	480
Vessel insurance		185
Fishing licence	38	42
General expenses	9	4
Total costs of operation	**9 490**	**10 240**
Gross cash flow	**19 790**	**37 820**
Depreciation	2 010	2 104
Interest (1)	347	381
Net profit	**17 433**	**35 335**

(1) Idem former table

12. BARBADOS

TABLE 47
Technical and operational characteristics of Barbadian fishing vessels

Characteristics	Dayboat	Iceboat
Length (m)	9	12
Power (KW)	60	135
Fish storage	no fish hold	10 m^3 for 5 tons fish + ice
Fishing gear	- Up to 3 gillnets 18 - 36 m long 3 m deep 4 cm stretched mesh - dipnet - handline - FAD	- Up to 6 gillnets 16 - 36 m long 3 m deep 4 cm stretched mesh - dipnet - handline - FAD
Crew	2	3
Ownership	Individual or 2 person partnership	Individual or 2 person partnership
Sharing system	- Boat 50 % - Crew: 2 shares for remaining 50 %	- Boat 50 % - Crew: 3 shares for remaining 50 %
Average fishing trip	1 day	7 days
Fishing days per year	125	100 to 125
Fishing seasons and off-seasons	Season: Nov.-Jul. Off-season: Aug.-Oct	Season: Nov.-Jul. Off-season: Aug.-Oct.

TABLE 48
Financial and economic performance of Barbadian fishing vessels (in US$)

Investment costs

	Hull	Propulsion	Equipment	Fishing gear	Total
Depreciation rate	4 %	10 %	10 %	20 %	
Investment costs (in US$)					
- Dayboat	7 500	12 500	1 500	500	22 500
- Iceboat	50 000	18 000	10 000	2 500	90 000

Economic and financial performance

	Type of vessel	
	Dayboat	Ice boat
Total earnings	**17 270**	**45 320**
Fuel & lubricant	3 125	3 625
Food	313	1 813
Landing tax	305	800
Ice		3 625
Labour share	6 920	11 139
Total labour charges	**6 920**	**11 139**
Repairs & maintenance	1 250	3 250
Vessel insurance	1 500	3 600
Total costs of operations	**13 413**	**27 852**
Gross cash flow	**3 857**	**17 468**
Depreciation	1 790	5 940
Interest (1)	1 170	4 505
Net profit	**897**	**7 023**

13. TRINIDAD & TOBAGO

TABLE 49

Technical and operational characteristics of Trinidadian fishing units

Type of vessel	Length (m)	KW	Onboard facilities /storage	Fishing gear	Crew	Fishing trip (days)	Fishing days/year
Artisanal trawler	7.9 - 10.4	35 - 80	Portable boxes with ice, average capacity: 31 kg	1 Trawl headrope 10.7 m mesh size 3.5 cm	2	1	145
Semi-industrial trawler	9.3 - 12.1	120 - 180	Ice hold with storage capacity 5 tons	1 Trawl headrope 12.90 m mesh size 3.5 cm	3	1	195
Industrial trawler	10.9 - 23.6	270 - 310	Ice hold with storage capacity 8 - 12 tons	2 Trawls headrope 15 m mesh size 3.5 cm	4	15	207

Ownership: individual for the three types of fishing. Some individual may own more than one vessel.

TABLE 50

Financial and economic performance of Trinidadian fishing units (in US$)

Investment costs

Investment	Hull, engine, fishing gear	Shore-based equipment	Total
Depreciation rate	10 %	20 %	
Cost of investment (in US$)			
Artisanal trawler	8 602	125	6 728
Semi-industrial trawler	48 387	3 052	51 440
Industrial trawler	95 968	3 540	99 508

Economic and financial performance

Type of vessel	Artisanal	Semi-industrial	Industrial
Total earnings	**24 231**	**65 337**	**78 280**
Fuel	7 773	27 213	35 041
Lubricants	1 102	1 258	2 863
Ice	807	2 672	5 007
Food		903	1 916
Costs of selling fish	335	1 059	308
Other running costs	805	2 153	2 224
Labour charges, wages	5 676	10 553	6 852
Gear expenses	1 634	6 454	11 836
Repairs & maintenance	2 303	5 932	6 478
Vessel insurance		484	2 361
General expenses	529	290	2 390
Total costs of operation	**20 964**	**58 971**	**81 276**
Gross cash flow	**3 267**	**6 366**	**- 2 996**
Depreciation	885	5 445	10 219
Interest (1)	551	3 367	6 514
Net profit	**1 831**	**- 2 446**	**- 19 729**

14. ARGENTINA

TABLE 51
Techno-economic and operational characteristics of Argentinian fishing units

Type of vessel	Length (m)	KW	On board facilities/storage	Fishing gear	Crew size (1)	Fishing days
Ice trawlers						
25 m	25	515	Ice + fishhold 64 tons	Bottom trawl	10	
30 m	30	661	Ice + fishhold 100 tons	"	13	
35 m	35	956	Ice + fishhold 170 tons	"	18	234

(1) Estimate

TABLE 52
Financial snd economic performance of Argentinian fishing units (in US$)

Investment costs

Investments in US$	Hull, engine and propulsion, fishing gear
Type of vessel	
Ice trawler 25 m	780 000
" 30 m	1 200 000
" 35 m	2 000 000

Economic and financial performance

Type of vessel	Trawler 25 m	Trawler 30 m	Trawler 35 m
Total earnings	**553 011**	**864 000**	**1 468 000**
Fuel	97 796	125 738	181 621
Harbour dues	40 555	58 008	97 320
Ice, freezing, preservation of catch	42 451	66 330	112 761
Labour shares, wages	109 200	162 240	238 680
Social insurance	58 800	87 360	128 520
Repairs and maintenance	53 783	67 082	117 114
Vessel insurance	5 131	6 480	10 540
General expenses	29 860	46 656	73 440
Total costs of operation	**666 890**	**733 930**	**1 280 390**
Gross cash flow	**115 435**	**244 106**	**508 804**
Depreciation	31 200	48 000	80 000
Interest (1)	31 600	48 600	81 000
Net profit	**52 635**	**147 506**	**347 804**

(1) Average amount for repayment on eight-year loan 80 percent of investment Interest rate 9 %.

15. PERU

TABLE 53

Technical and operational characteristics of Peruvian fishing units

Types of fishing	N° of vessels	m^3 average	On board facilities	Ownership	Fishing days
Purse seiners					
Sardine, anchovy (fishmeal)	598	272	no conservation 95 % RSW 5 %	Company	192
Since 1992, new boats are built with RSW conservation system, the average reaches 350 m^3					
Anchovy, Sardine, Horsemackerel, Mackerel	16	430	RSW 80 % Ice 20 %	Company	192
New boats built since 1995:					
Purse-seiners/Trawlers					
Horsemackerel, Mackerel	49	348	RSW 61 % Ice 39 %	Company	192
Major type was built in 1995 with 867 m3 for direct human consumption					
Trawlers					
Hake	63	102	Ice 95 % Freezing 5 %	Company	192
Majority of boats were built between 1960 and 1975, only 12 since 1985 (average 200 m^3)					

TABLE 54
Financial and economic performance of Peruvian fishing units (in US$)

Investment costs

Investments	Hull	Engine and other equipment	Fishing gear	Total value
Depreciation rate	4 %	6.6 %	10 %	
Type of vessel				
Purse seiners				
350 m'	1 448 500	151 500	258 000	1 858 000
650 m'	4 038 000	402 000 (1)	400 000	4 840 000
Trawlers				
102 m'	168 000	52 500	25 000	245 500
120 m'	198 000	67 000	25 .500	290 500

Economic and financial performance

Type of vessel		Purse seiner		Trawler	
	200 m'	350 m'	650 m'	102 m'	120 m'
Conservation	Ice	RSW	RSW	Ice	Ice
Landings (tons)	6 640	41 011	77 760	4 061	4 752
Total earnings	**846 720**	**1 722 470**	**3 264 920**	**536 026**	**627 264**
Fuel	329 523	441 151	618 722	252 578	286 032
Lubricant	33 776	45 218	63 419	25 889	29 318
Food	10 133	27 131	38 051	15 534	17 298
Labour share	192 617	381 792	684 804	118 812	139 035
Social insurance	66 044	130 907	235 145	40 737	47 672
Repairs & maintenance	13 272	35 190	83 108	4 770	8 601
Fishing licence	3 802	18 045	34 214	2 113	2 486
Vessel insurance	9 611	49 330	128 502	8 518	7 713
General expenses	16 934	14 124	26 127	8 684	10 162
Taxes	28 740	57 172	108 691	2 600	8 258
Total costs operations	**704 452**	**1 200 060**	**2 020 783**	**478 235**	**551 575**
Gross cash flow	**142 268**	**522 410**	**1 244 137**	**57 791**	**75 689**
Depreciation	17 697	93 840	221 620	12 720	14 937
Interest (1)	57 509	295 170	768 903	39 001	46 160
Net profit	**67 062**	**133 400**	**253 614**	**6 070**	**14 602**

(1) Average amount for repayment on five-year loan 60% of investment. Interest rate 17%.

Annex II

Programme

of Inter-regional Workshop on Techno-economic Performance of Marine Capture Fisheries and the Role of Economic Incentives, Value Addition and Changes of Fleet Structure

LUCKNOW, 2-6 APRIL 2001

Monday, 2 April

Morning

9.00-9.30	Registration of Workshop Participants
9.30-10.30	Opening Ceremony
• Welcome Address:	M.A. Upare, General Manager, NABARD
• Introduction to Bankers Institute of Rural Development (BIRD):	R. Bhaskaran, Joint Director, BIRD
• Keynote Address:	Kishanjit Basu, Director, BIRD
• Opening Address:	P. Rosenegger, FAO Representative in INDIA
• Vote of Thanks	P.S. Mohanan, Manager, BIRD
10.30-11.00	Tea Break

Technical Session I

Chairman:	M.A. Upare
Rapporteur:	J. Prado
11.00-11.45	Role of Bay of Bengal Programme in Sustainable Development of Small-Scale Coastal Marine Fisheries in the Region, by Dr. Y.S. Yadava, Co-ordinator, Bay of Bengal Programme
11.45-12.30	Changes of Fishing Fleets and Technology in relation to Fisheries and Human Resources in India, by Dr. S. Somvanshi, Director-General, Fishery Survey of India, Mumbai
12.30-13.00	The Role of Fisheries Education in Enhancing the Economic Performance of Fisheries in India, by Dr. S. Ayyapan, Director and Vice-Chancellor, Central Institute of Fisheries Education, Mumbai
13.00-14.00	Lunch Break

Afternoon

Technical Session II

Chairman:	Prof. Dr. Ying-qi Zhou
Rapporteur:	Dr. U. Tietze
14.00-14.15	Presentation on Organisational Arrangements and Programme
14.15-15.30	Presentation and Discussion on findings of Comparative Analysis of Global FAO Study on Economic Viability of Marine Capture Fisheries with regard to Economic and Financial Performance – by J.M. Le Ry, FAO Consultant
15.30-15.45	Tea Break
15.45-17.00	Presentation and Discussion on Findings of Comparative Analysis of Global FAO Study on Economic Viability of Marine Capture Fisheries with regard to Cost Structure of Marine Capture Fisheries, by Mr. R. Lasch, FAO Consultant
20.30-21.30	Dinner

Tuesday 3 April

Morning

Technical Session III

Chairman:	M.A. Upare
Rapporteur:	Dr. E. Ruckes
9.00-10.15	Methodology for Fishing Fleet Typology Analysis, Critical Factors for Fishing Unit Performance and Indicators of Sustainable Fishing Practices, by J. Prado, FAO
10.15-10.45	Country Presentations on Recent Changes of Costs and Earnings of Marine Capture Fisheries and Underlying Causes (Prof. Yingqi Zhou, Peoples Republic of China; Chang Gil Kim, Republic of Korea)
10.45-11.00	Tea Break
11.00-12.45	Country Presentations continued. (Dr. Somying Piumsombun, Thailand; M.A. Upare, India; Prof. T. Vassdal, Norway, J-M Le Ry, France; R. Lasch,Germany)
12.45-14.00	Lunch Break

Afternoon

Technical Session IV

Chairman	Dr. Y.S. Yadava
Rapporteur	Dr. U. Tietze
14.00-15.00	Value Addition in Fisheries and Economic Benefits of Fish Utilisation, by Dr. E. Ruckes, FAO
15.00-15.45	Scientific and Technical Information and Fishery Industry Development, by J.V. H. Dixitulu, Editor, Fishing Chimes of India
15.45-16.00	Tea Break
16.00-16.45	Population and Development Dynamics of Rural Fishing Communities in Thane district of Coastal Maharashtra in India and the Role of Krishi Vigyan Kendra in Fisheries Development, by Suchitra Upare, Konkan Agricultural University
16.45-17.15	Economic Incentives and Subsides in Marine Capture Fisheries in India, by Dr Lata Shenoy, CIFE

Wednesday, 4 April

Morning

8.00-13.00	Field Visit

Afternoon

14.00-15.45	Introduction to Working Groups and Working Group Sessions
Group I:	Analysis of Empirical Data on Impact of Cost Reducing and Revenue Enhancing Government Financial Transfers on the Economic and Financial Performance of Fishing Fleets
Group II:	Development Priorities and Assistance Needs for Strengthening of Fish Capture, Culture, Processing and Marketing in India

Thursday, 5 April

Morning

9.00-10.45	Working Groups I & II continued
10.45-11.00	Tea Break
11.00-12.45	Working Groups I and II continued
12.45-14.00	Lunch Break

Afternoon

14.00-17.45	Working Groups III & IV
Group III:	Role of Utilisation of Catch /Value Addition and Marketing of Fishery Products with regard to Economic/Financial Performance of Fishing Fleets
Group IV:	Technological and Operational Features of Fishing Fleets and their Contribution to an Economically Efficient and Sustainable Exploitation of Fish Stocks
19.00-20.30	Cultural Programme

Friday, 6 April

Morning

Technical Session V

Chairman:	Dr V. Somavanshi
Rapporteur:	Shri G.S. Mehta
9.00-1045	Presentation and Discussion of Working Group Reports
10.45-11.00	Tea Break
11.00-11.45	Continued
11.45-12.15	Closing Ceremony
Review	Dr U. Tietze, FAO - Rome
Address	Bishnu P. Shreshta, Asia and Pacific and Rural Agricultural Credit Association
Closing Address	V.S. Bhadauria, Principal, NGSC, Lucknow
Vote of Thanks	Prof. Ying-qi-Zhou, Shanghai Fisheries University
Vote of Thanks	Mr S.K. Bhatnagar, National Bank for Agriculture and Rural Development

Annex III

List of participants

of Inter-regional Workshop on Techno-economic Performance of Marine Capture Fisheries and the Role of Economic Incentives, Value Addition and Changes of Fleet Structure

LUCKNOW, 2-6 APRIL 2001

Name	**Designation/Organization/ Country**
Prof. Dr. Ying-qi Zhou	President, Shanghai Fisheries University, Shanghai, Peoples Republic of China
J.M. Lery	International Consultant, Quimper, Bretagne, France
Dr. Somying Piumsombun	Senior Fisheries Economics Advisor, Ministry of Agriculture and Co-operatives, Bangkok, Thailand
Prof. Dr. T. Vassdal	University of Tromsoe, Norway
Dr. Chang Gil Kim	Senior Scientist, National Fisheries Research and Development Institute, Pusan, Republic of Korea
Bishnu P. Shrestha	Managing Director, Asia and Pacific Regional Agricultural Credit Association Consultancy Services, Jakarta, Indonesia
R. Lasch	Head (retired), Institute of Agricultural Market Research, Federal Agricultural Research Center, Braunschweig, Germany
Dr. V.S. Somvanshi	Director General, Fishery Survey of India, Mumbai, India
Dr. S. Ayyappan	Director, Central Institute of Fisheries Education, Mumbai, India
Dr. Y. S. Yadava	Interim Inter-governmental Organisation Co-ordinator of the Bay of Bengal Programme, Chennai, India
M.A. Upare	General Manager, National Bank for Agriculture and Rural Development, Mumbai, India
K. Balachandran	Principal, Central Institute of Fisheries Technology, Cochin, India
K. Jagadees	Deputy Director, Marine Products Export Development Authority, Cochin, India
M.T. Bhartiya	Deputy General Manager, National Bank for Agriculture and Rural Development, Mumbai, India
Prof. Latha Shenoy	Senior Scientist, Central Institute of Fisheries Education, Mumbai, India
M.U. Suchitra	Assistant Prof., Konkan Agricultural University, Ratnagiri, India
G.S. Mehta	Deputy General Manager, National Bank for Agriculture and Rural Development, Lucknow, India
P.S. Garg	Managing Director, Fisheries Co-operative Federation, Lucknow, India
M. Bhushan	Training Manager, Punjab National Bank, Lucknow, India
J.V.H. Dixitulu	Editor, Fishing Chimes, Visakhapatnam, India
Dr. A. Purnachand	Chief Manager, State Bank of India, Lucknow, India

Dr. M.S. Chandage	Head, Dept. of Fisheries Resources, College of Fisheries, Shirgaoun, Ratnagiri, India
Rekha Kahu	Programme Assistant, FAO Representation in India, Dehli, India
Mr. P. Rosenegger	FAO Representative in India, Dehli, India
Dr. E. Ruckes	FAO Senior Fishery Industry, FAO Rome, Italy
Dr. U. Tietze	FAO Fishery Industry Officer, FAO Rome, Italy
J. Prado	FAO Fishery Industry Officer, FAO Rome, Italy

Annex IV

Summary proceedings

of Inter-regional Workshop on Techno-economic Performance of Marine Capture Fisheries and the Role of Economic Incentives, Value Addition and Changes of Fleet Structure

LUCKNOW, 2-6 APRIL 2001

PARTICIPATION AND ORGANISATIONAL ARRANGEMENTS

The workshop was organised by the National Bank for Agriculture and Rural Development (NABARD) and attended by 27 foreign and Indian experts including the authors of national level cost and earnings studies from the Peoples Republic of China, the Republic of Korea, Thailand, India, France, Norway, Germany as well as the experts who had undertaken the comparative analysis of all national level studies including those from South America, the Caribbean and Africa.

Among the Indian participants were senior representatives of the Indian fisheries administration, research, education, finance, fishermen organisations as well as of the fishing industry among them the Director-General of the Fishery Survey of India, the Director of the Central Institute of Fisheries Education, the long-time editor of the leading Indian fisheries journal, the former fisheries development commissioner and present BOBP coordinator, Dr. Yadava as well as senior representatives of the Marine Products Export Promotion Authority and the Central Institute of Fishing Technology.

WORKSHOP PROCEEDINGS[16]

The programme of the workshop and the list of participants are attached below as ANNEX II and III. The proceedings included presentations and discussions on Indian marine capture fisheries including resources, fishing technology, research, information and education, economic performance and subsidies and on traditional fishing communities.

During the opening ceremony, Mr. M. A. Upare, General Manager of the National Bank for Agriculture and Rural Development (NABARD) of India, in-charge of fisheries finance in India, welcomed the workshop participants and drew their attention to the longstanding co-operation between NABARD and FAO in the promotion of sustainable fisheries development and related credit and investment facilities in India and other countries. He highlighted the important economic and nutritional role of fisheries in India and the role of NABARD in providing credit and investment support for the introduction of responsible and economically efficient fishing practices.

Mr. R. Baskaran, Joint Director of the Bankers Institute of Rural Development (BIRD) briefed the workshop participants about the role of BIRD and its functioning, which included the design and implementation of customised training programmes, action oriented research, policy guidance for Government and financial institutions, organisation of seminars and conferences as well as publishing.

Mr. Kishanjit Basu, Director, BIRD delivered the keynote address. The speaker drew the attention of the audience to the problem of unsustainable yields and over-exploitation of fisheries resources in India and other parts of the world which were caused by the open access character of fisheries resources. He highlighted the need to change to sustainable fishing practices and levels of exploitation and stressed the role of NABARD in providing guidance and investment support. Mr. Basu also underlined the importance of involving local communities in fisheries management and development and the need for participatory approaches in the implementation of the Code of Conduct for Responsible Fisheries.

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[16] For a summary of the proceedings of the inter-regional workshop on the techno-economic performance of marine capture fisheries and the role of economic incentives, value-addition and changes of fleet structure see also Fishing Chimes, Volume 21, No. 2, May 2001, India.

In his opening address, Mr. P. Rosenegger, FAO Representative in India, thanked NABARD and BIRD for having co-operated with FAO in the organisation of the workshop and complimented NABARD for the assistance the Bank has provided to the small-scale fisheries sector in India. Mr. Rosenegger expressed the hope that the discussions at the workshop and the findings of the studies would provide guidance to fishery industries, financial institutions and concerned Government authorities for the introduction of sustainable and economically efficient fishing practices. In this context, the speaker highlighted three main issues i.e. occupational diversification for coastal fishermen and creation of employment opportunities outside fisheries, increased emphasis on value-addition to make better use of existing resources and improving the capabilities of small and medium size fishing craft. The speaker also thanked the Indian Government authorities for their efforts in implementing the Code of Conduct for Responsible Fisheries in India. The opening session concluded with a Vote of Thanks by Mr. P.S. Mohanan, Manager, BIRD.

The programme of the workshop contained a number of key presentations of fisheries and fisheries development in India. Dr. V.S. Somvanshi, Director-General, Fishery Survey of India, presented a paper on changes of fishing fleets and fishing technology in India. The speaker commenced with an overview of the development of bottom trawling in India, which had succeeded in harvesting demersal resources up to the depth of 300 m. This was followed by an overview of the development of pelagic fishing methods, which was characterised by the replacement of traditional Rampani nets through purse seines and boat seines and by the introduction of ring net fishing in Kerala.

The major technological changes in India's marine capture fisheries, which have led to higher productivity and expansion of fishing operations and better incomes of fishermen were identified by Dr. Somvanshi as use the of synthetic twines and ropes and durable floats and related changes in the design of gillnets, shore and boat seines, use of modern electronics in the form of echo-sounders, global positioning systems, radios, mobile phones etc. The speaker also observed that in some cases, the use of more efficient fishing technologies had led to the overexploitation of fisheries resources.

As far as the future is concerned, Dr. Somvanshi explained that emphasis was on introduction of resource specific fishing vessels of about 18 m length, which were capable of exploiting the more distant and deeper waters of the Indian EEZ as well as on upgrading of the efficiency of traditional small-scale fishing craft, among other things through further motorization. The speaker concluded his presentation by emphasising the need for manpower development and training to meet the challenges of sustainable and responsible fisheries development and to ensure the conservation of fish stocks.

Dr. S. Ayyapan, Director, Central Institute of Fisheries Education (CIFE), explained the structure of fisheries education and training in India at the various levels and the linkages with the fishery industry and fisheries research and administration. In addition to CIFE, which is a deemed university, there are 11 State Agricultural Universities and one Central Agricultural Universities where fisheries is taught and fisheries research is being conducted besides several other universities and colleges at state level. The speaker then elaborated on aspects related to course design, information technology, vocational training and linkages with fishery industry.

Concluding his presentation, the speaker identified the future priorities for fisheries education in India. These include the identification of manpower requirements of different sectors of the fishery industry with expected qualifications and specialisation, revision and updating of syllabi to meet the needs of capture fisheries and aquaculture industry and to incorporate latest development in information technology and biotechnology, improvement of co-operation and sharing of responsibilities between CIFE, fisheries institutes and colleges and greater emphasis on hands-on-training, business management, project planning and evaluation and social sciences.

Dr. Y.S. Yadava, former Fisheries Commissioner of India and Interim Co-ordinator of the Bay of Bengal Programme (BOBP) for Fisheries Management, gave an overview of the Bay of Bengal Programme, which had been operational since 1979 and promoted fisheries development and management in the countries bordering the Bay of Bengal. The speaker highlighted the focus of work and the main achievements of the three different phases of the programme, which had paid attention to the various technological, biological, economic, social and management aspects of small-scale fisheries development.

The BOBP had made a tangible impact on improving fishing and fish culture practices and also promoted the access of traditional fishing communities to institutional credit and promoted the empowerment of women in fishing communities. It also had generated a wealth of information on all aspects of small-scale fisheries in the region, which could be tapped for future development and management purposes and activities. Concluding his presentation, Dr. Yadava explained that the Bay of Bengal Programme was presently being converted to an Intergovernmental Organisation, which would continue to promote and facilitate fisheries development and management in the region.

Other key presentations from India included a presentation by J.V.H. Dixitulu, editor of Fishing Chimes, the role of scientific and technical information in fishery industry development, a presentation by Prof. Lata Shenoy, Senior Scientist, Central Institute of Fisheries Education on economic incentives and subsidies in marine capture fisheries in India, and a paper on population and development dynamics of rural fishing communities by Ms Suchitra Upare, Assistant Professor, Konkan Agricultural University.

The core programme of the workshop focussed on presentation and discussion of the findings of the recently completed global FAO study on the economic performance of the marine capture fisheries and on the changes which have taken place since the previous studies were carried out. One presentation summarised the findings of the comparative analysis of the cost structure of marine capture fisheries in different countries and different fisheries and another presentation summarised the findings of the comparative analysis of the economic and financial performance. In addition, specific country reports were presented on France, Germany, Norway, India, Thailand, Republic of Korea and the Peoples Republic of China.

Two presentations by FAO experts highlighted specific analytical aspects of the study. Mr. J. Prado, FAO fishing technologist, focussed on methodological aspects of fishing fleet analysis and indicators for sustainable fishing practices and Dr. E. Ruckes, senior FAO fish utilisation and marketing expert elaborated on value addition and economic benefits of fish utilisation.

The final two days of the workshop were spent in working groups. Four working groups were formed which undertook the following work:

Group 1: analysis of empirical data on the impact of cost reducing and revenue enhancing Government financial transfers on the economic and financial performance of fishing fleets

Group 2: identification of development priorities and assistance needs for strengthening of fish capture, culture, processing and marketing in India

Group 3: formulation of recommendations on utilisation of catch /value addition with regard to economic/financial performance of fishing fleets

Group 4: consideration of technological and operational features of fishing fleets

Regarding development priorities and assistance needs for strengthening of fish capture, culture, processing and marketing in India the following recommendations were endorsed in plenary as follows.

This paper summarizes the findings of 15 country level studies on the economic and financial performance of marine capture fisheries conducted in 1999 and 2000. The studies validate the findings of surveys carried out between 1995 and 1997 and published in FAO Fisheries Technical Paper No. 377. Most types of vessels, i.e. 92 out of the 108 types of vessels covered by the study, or 85 percent, showed a net profit after deducting the cost of depreciation and interest. These overall positive results were also achieved because of higher prices paid to producers as compared to the previous study period. There were only a few indications that fishing effort had been reduced and fish stocks had recovered. It was also observed that some fishing fleets had adapted themselves to new conditions dictated by depleted and changing abundance of resources and new access to markets in the context of globalization by changing their fishing operations. Those vessels that had previously shown positive results but now incurred losses were generally older vessels, which continued to work on overexploited stocks. Regarding the impact of government financial transfers, it was found that many fishing vessels that still received subsidies would also have been profitable without them. In the case of most countries it was observed that no detailed empirical information was available either on the amount of government financial transfers to the fishing industry or on the financial performance of individual fishing enterprises

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